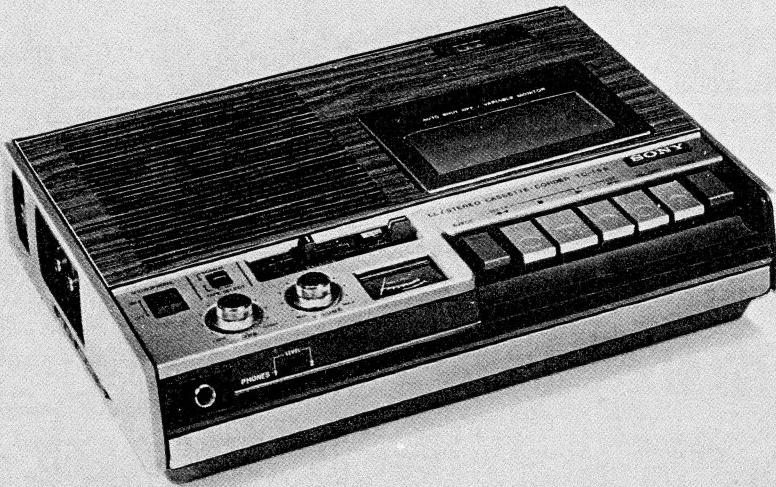


# TC-156

443

E Model  
AEP Model



## LL/STEREO CASSETTE-CORDER

### SPECIFICATIONS

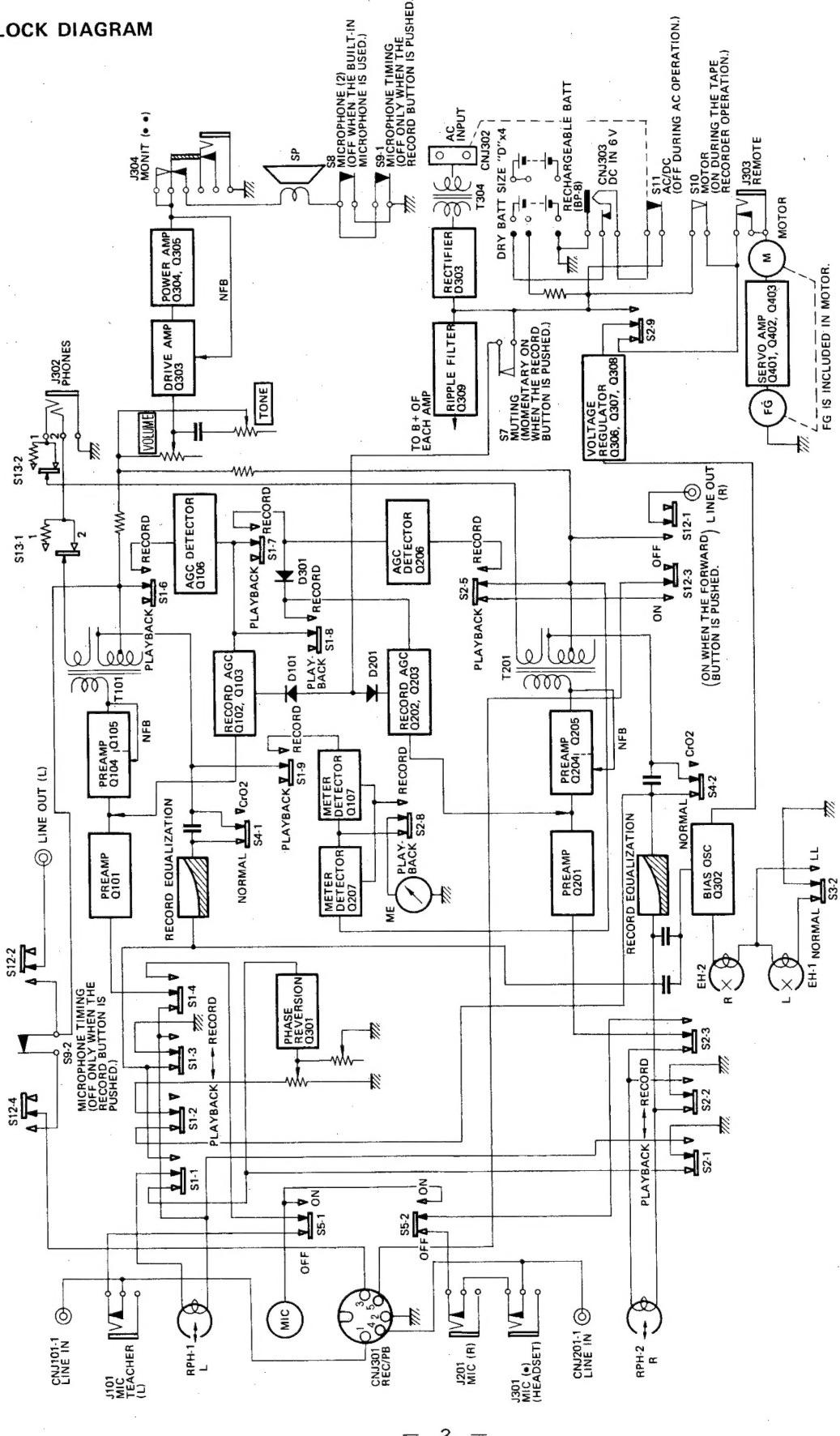
<b>Power Requirements:</b>	110V, 127, 220 and 240V, AC 50/60Hz (AEP) 100 ~ 110V, 115 ~ 127V, 200 ~ 220V and 230 ~ 250V, AC 50/60 Hz (E) DC 6V	<b>Outputs:</b> Two LINE INPUTs Impedance: 560 kΩ Maximum sensitivity: -22 dB (60 mV) REC/PB connector Input impedance: 2 kΩ
<b>Power Consumption:</b>	AC 8.5 W (E) AC 12W (AEP)	<b>Two LINE OUTPUTs</b> Impedance: 10 kΩ or more Output level: 0 dB (0.775 V) with 100 kΩ load
<b>Track System:</b>	Four-track stereo/LL	<b>MONITOR output</b> Impedance: 10 kΩ or more Accepts an 8 ohms earphone
<b>Tape Speed:</b>	4.8 cm/s (1 7/8 ips)	Output level: 0 dB (0.775 V) with 10 kΩ load
<b>Frequency Response:</b>	40 ~ 10,000 Hz (at normal tape) 40 ~ 13,000 Hz (at chromium dioxide tape)	<b>PHONES jack</b> Impedance: 8 Ω Output level: -30 dB (25 mV)
<b>Signal-to-Noise Ratio:</b>	47 dB	<b>REC/PB connector</b> Output impedance: 8 kΩ Load impedance: 50 kΩ
<b>Wow and Flutter:</b>	0.22% (RMS) weighted.	<b>Battery Life:</b> Long-life dry cell Approximately 7.5 hours of continuous recording by using built-in microphone
<b>Overall Distortion:</b>	2.5%:	Rechargeable battery Approximately 6.5 hours of continuous recording by using built-in microphone (charging time: approximately 24 hours)
<b>Erase Ratio:</b>	60 dB	<b>Speaker:</b> 10 cm (4") dynamic speaker Voice coil impedance: 8 Ω
<b>Cross Talk:</b>	55 dB (between tracks) 26 dB (between channels)	<b>Semiconductors:</b> 1 FET, 26 transistors and 9 diodes
<b>Power Output:</b>	1.5W maximum	<b>Dimensions:</b> 322(w) x 80(d) x 238(h) mm 12 11/16(w) x 3 3/16(d) x 9 3/8 (h) inches
<b>Record Bias Frequency:</b>	Approx. 85 kHz	<b>Weight:</b> 3.8 kg, 8 lb 7 oz (with battery)
<b>Erase Head:</b>	EF152-3602 (540 Ω/80 kHz)	
<b>Record/playback Head:</b>	PP128-3602 (750Ω/1 kHz)	
<b>Motor:</b>	D-009F (servo controlled)	
<b>Built-in Microphone:</b>	C-1002A (electret condenser)	
<b>Automatic Shut-off Mechanism:</b>	Tape tension detection system (operates in playback and record modes only)	
<b>Inputs:</b>	Two MIC inputs Impedance: Low impedance Maximum sensitivity: -72 dB (0.2 mV)	

**SONY**  
**SERVICE MANUAL**

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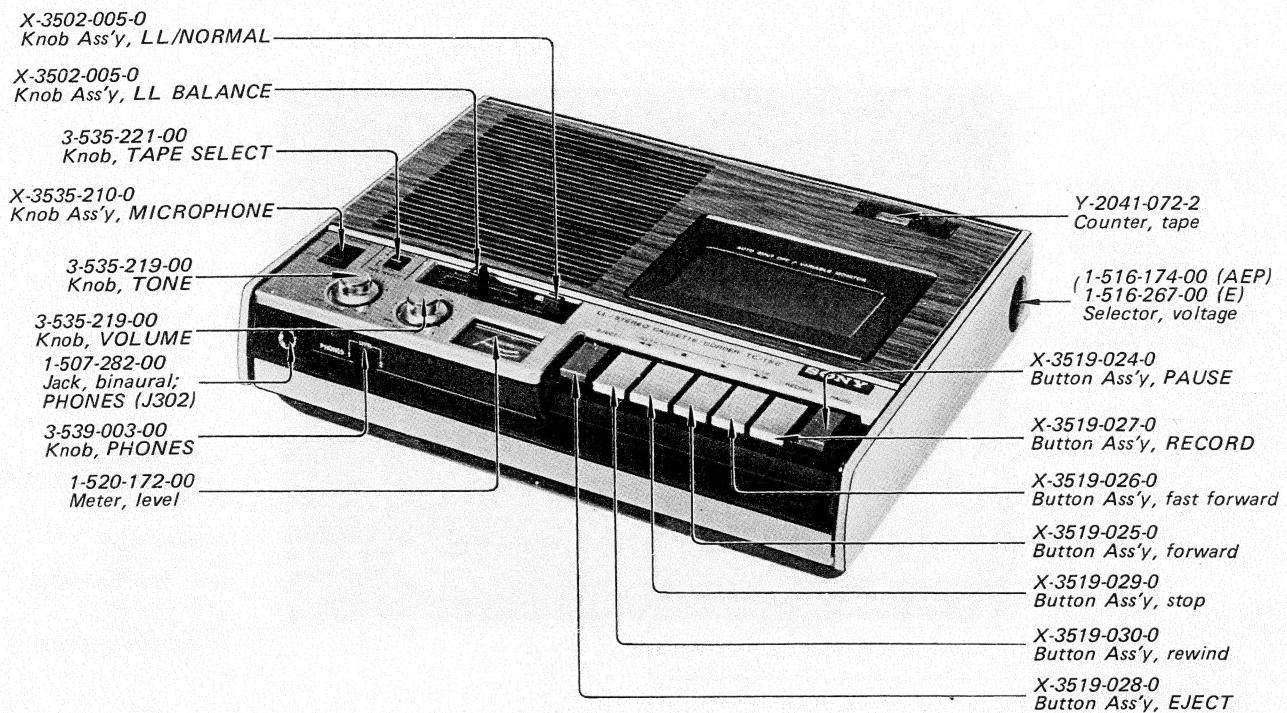
## **SECTION 1 OUTLINE**

## 1-1. BLOCK DIAGRAM

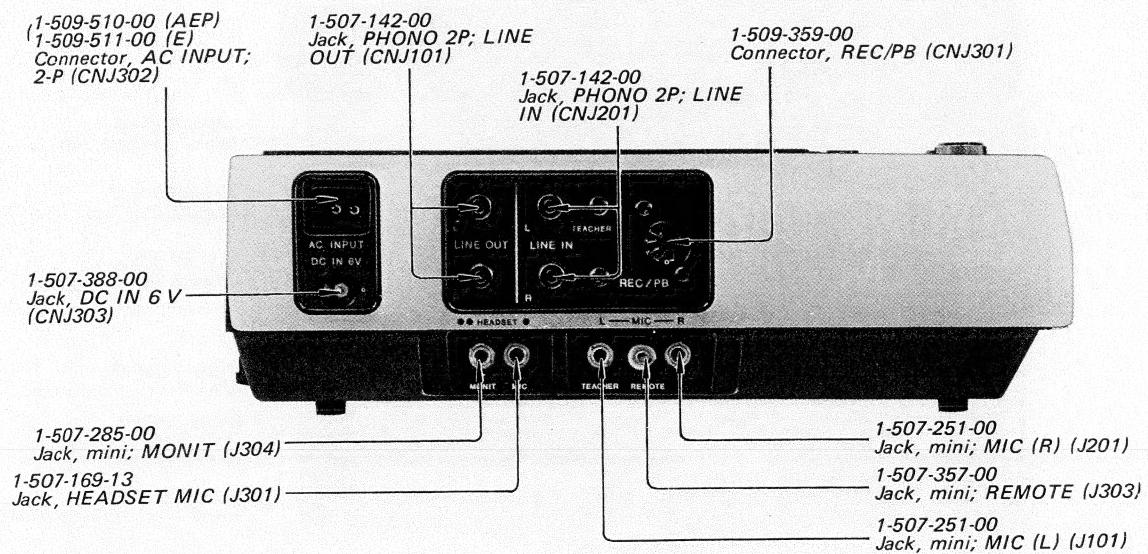


## 1-2. EXTERNAL VIEWS

(1)

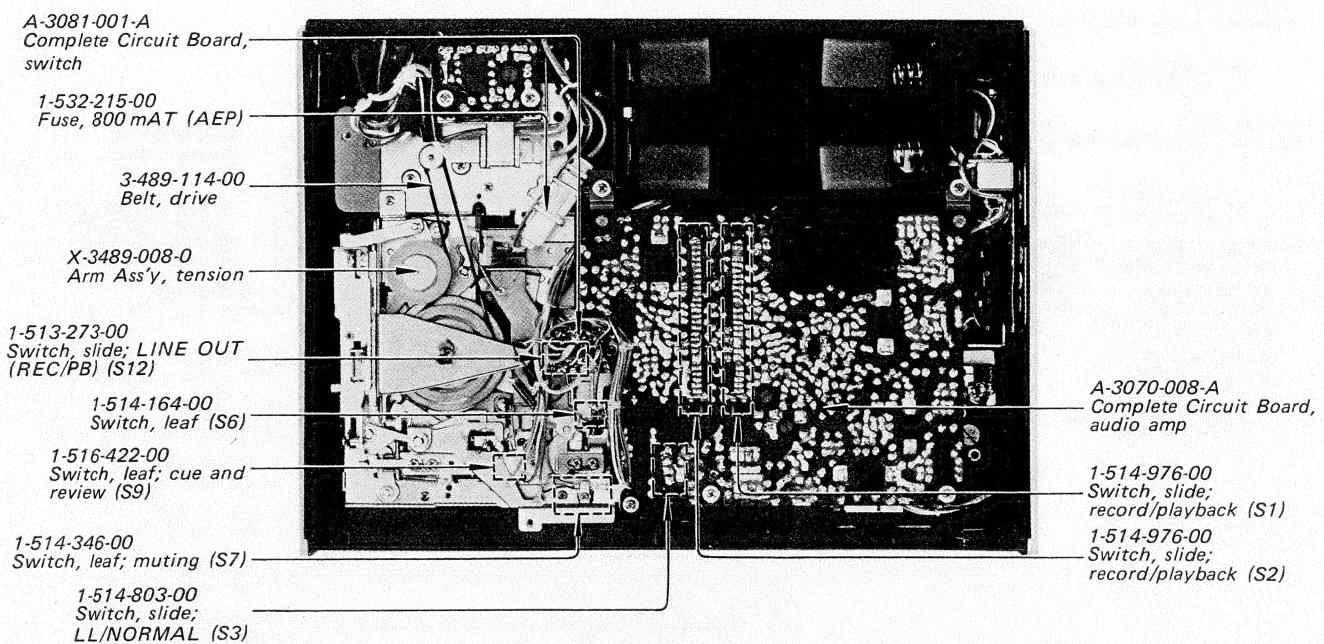


(2)

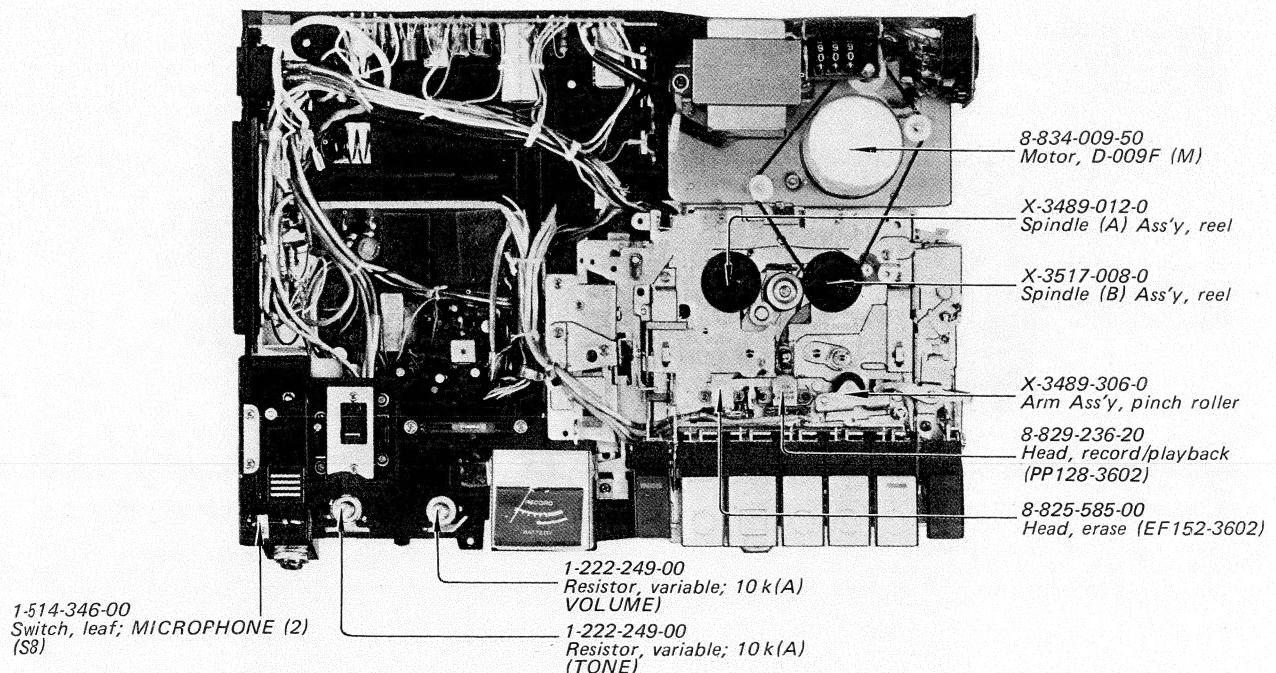


## 1-3. INTERNAL VIEWS

(1)



(2)

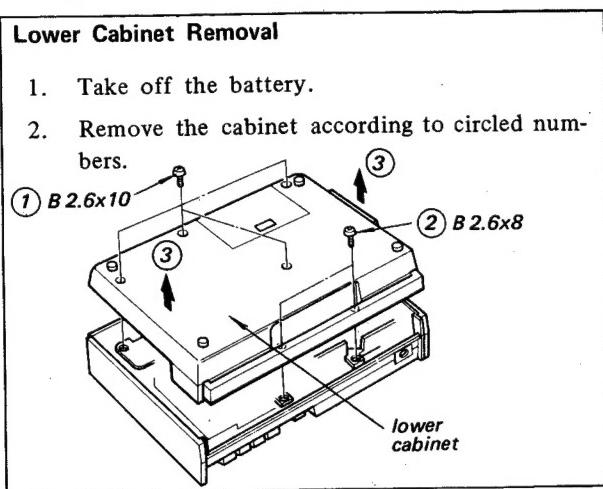


## SECTION 2 DISASSEMBLY AND REPLACEMENT

Note: All screws are Phillips type (cross recess type) unless otherwise indicated.  
(-) : slotted head

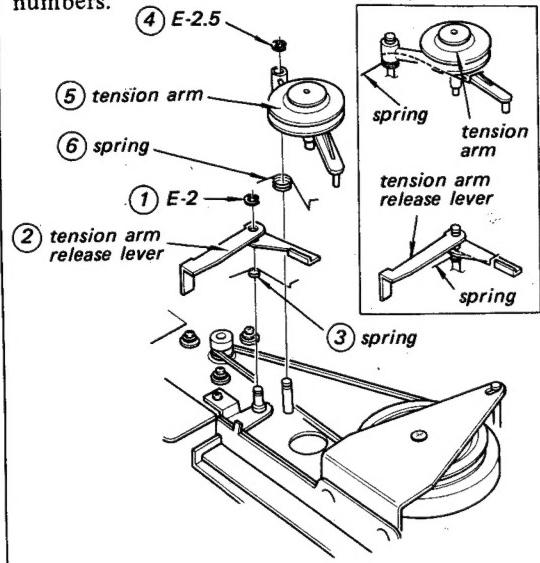
### Lower Cabinet Removal

1. Take off the battery.
2. Remove the cabinet according to circled numbers.



### Tension Arm Removal

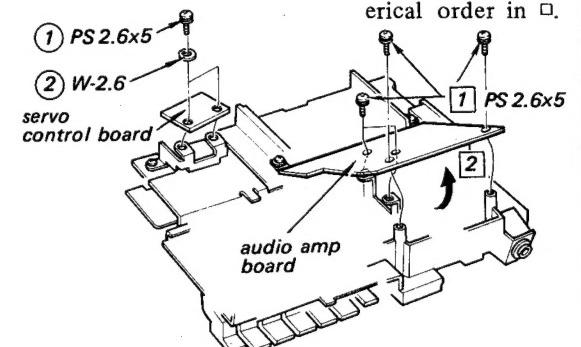
Remove the tension arm according to circled numbers.



### Complete Circuit Board Removal

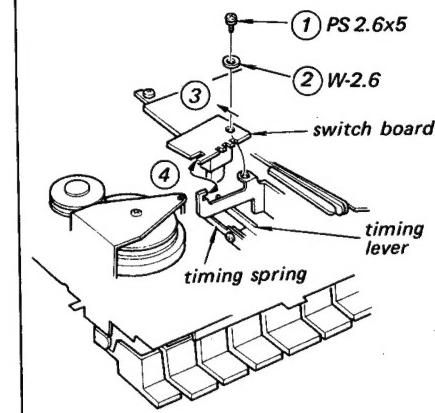
Servo control circuit board . . . Remove it by following in the numerical order in ○.

Audio amp circuit board . . . Remove it by following in the numerical order in □.



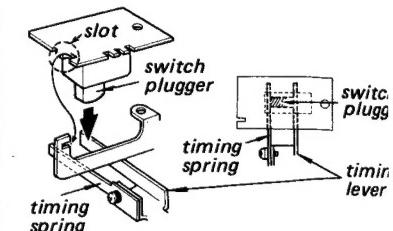
### Switch Board Removal

Remove the switch board according to circled numbers.



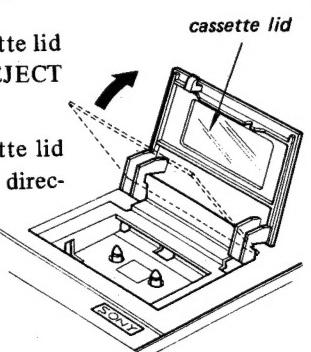
### Switch Board Installation

1. Insert the switch plugger between timing lever and timing spring as shown.
2. Attach the switch board as shown.



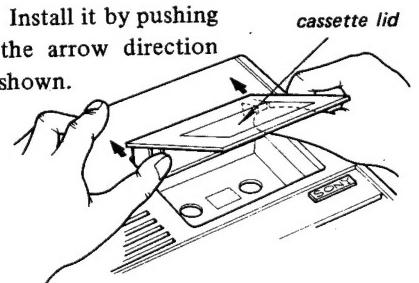
### Cassette Lid Removal

1. Open the cassette lid by depressing EJECT button.
2. Push the cassette lid in the arrow direction as shown.



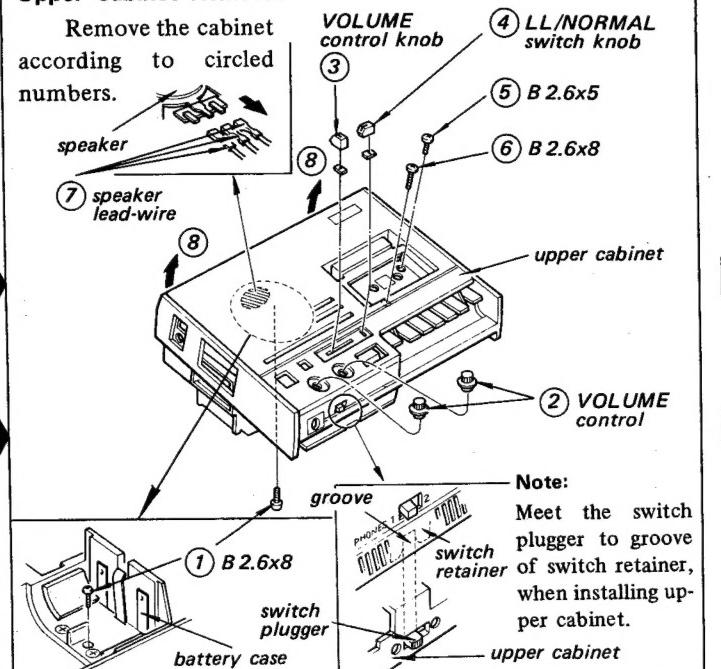
### Cassette Lid Installation

- Install it by pushing in the arrow direction as shown.



### Upper Cabinet Removal

Remove the cabinet according to circled numbers.



### Take-up Reel Spindle, Supply Reel Spindle, Motor and Idler Ass'y Removal

Motor . . . Remove it in the numerical order in ○.

Supply

reel spindle . . . Remove it in the numerical order in △.

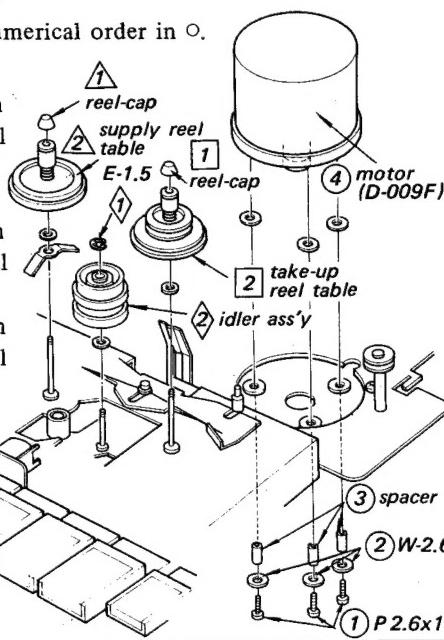
Take-up

reel spindle . . . Remove it in the numerical order in □.

Idler Ass'y . . . Remove it in the numerical order in ◇.

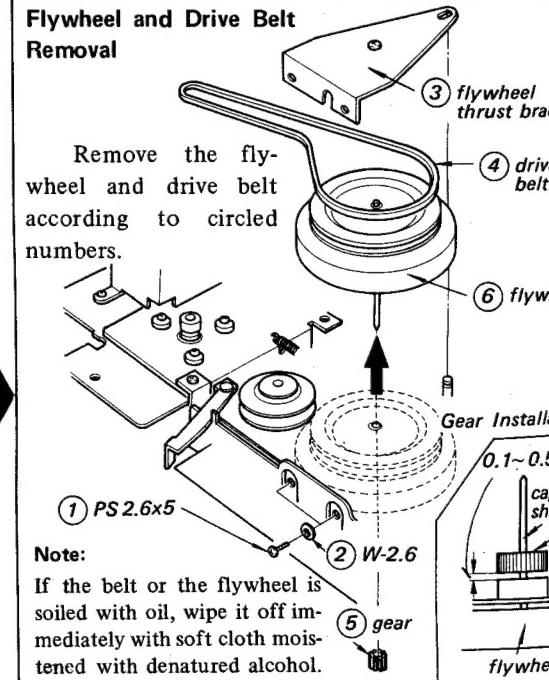
#### Note:

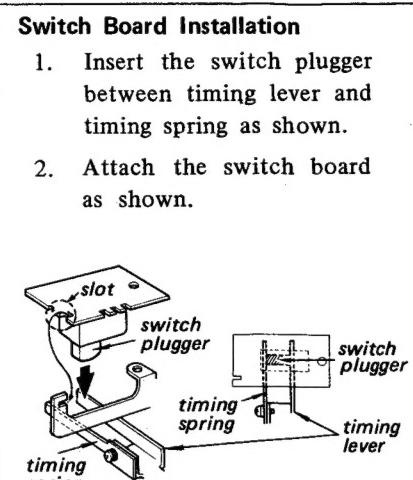
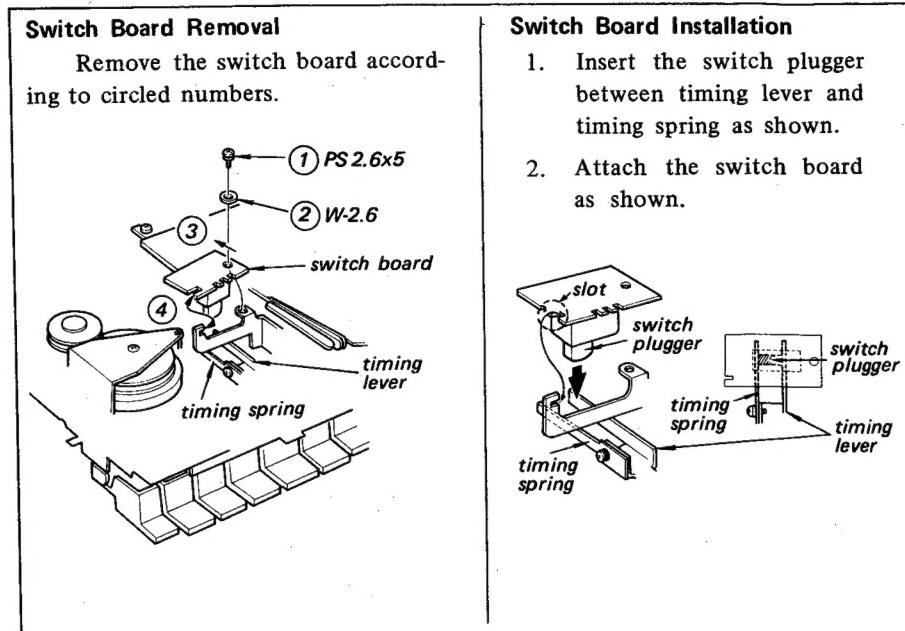
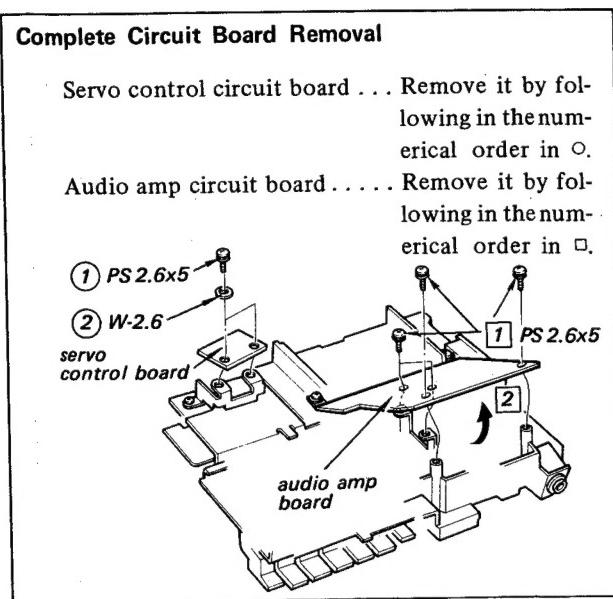
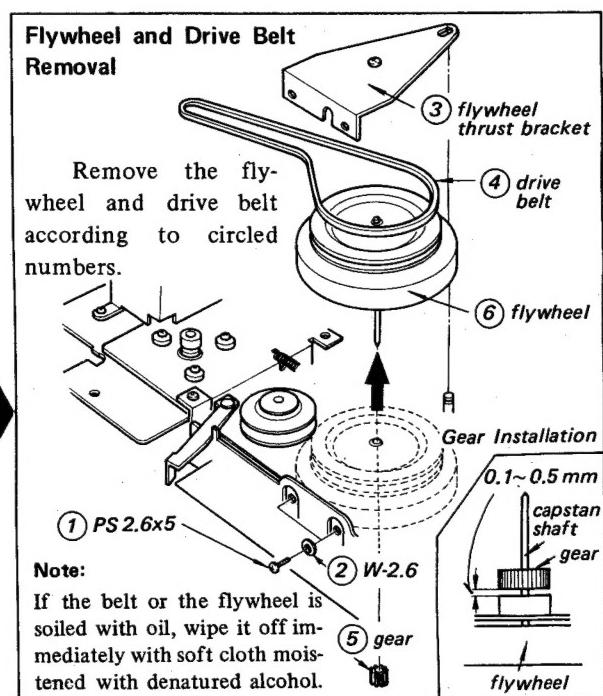
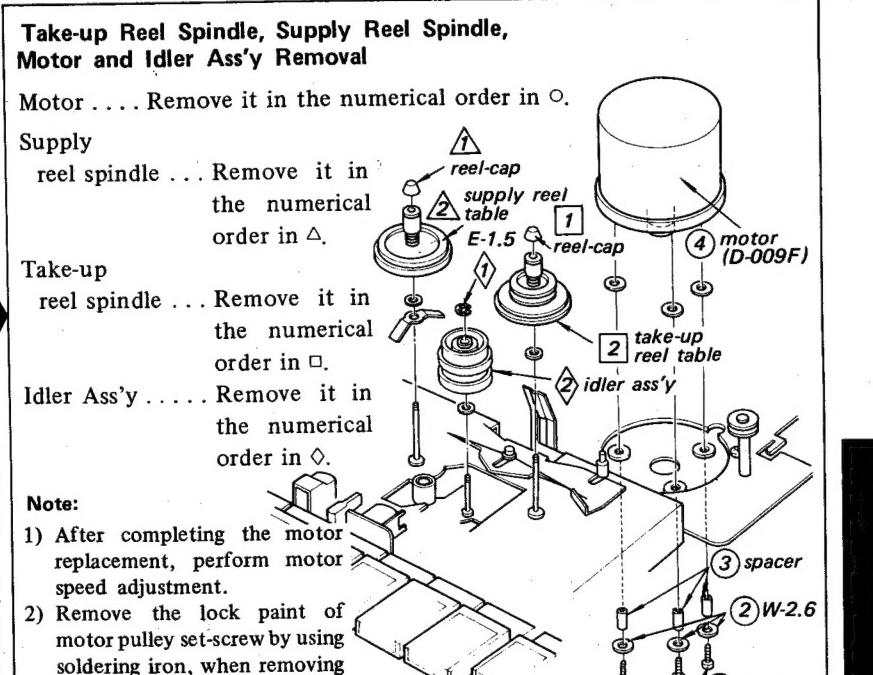
- 1) After completing the motor replacement, perform motor speed adjustment.
- 2) Remove the lock paint of motor pulley set-screw by using soldering iron, when removing motor pulley.



### Flywheel and Drive Belt Removal

Remove the flywheel and drive belt according to circled numbers.



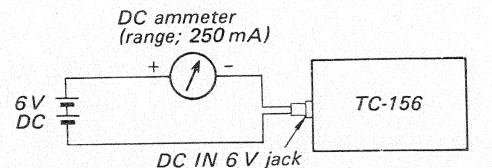
**MEMO**

### SECTION 3 MECHANICAL ADJUSTMENTS

#### FLYWHEEL THRUST PLAY ADJUSTMENT

##### — Playback Mode —

1. Loosen the thrust screw for sufficient flywheel play.
2. Tighten the screw until current suddenly increases, then loosen the screw 90 degrees.
3. Apply locking compound to the screw.

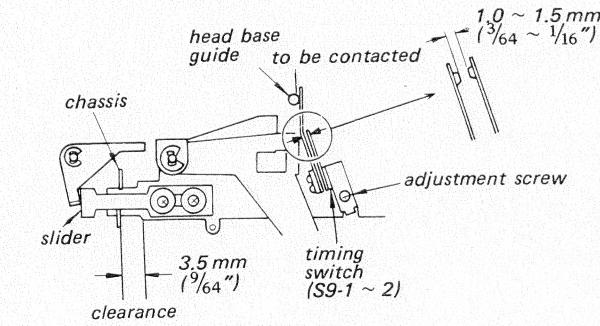


#### TIMING SWITCH POSITION ADJUSTMENT

##### — Stop Mode —

When slowly depressing the record button for the specified clearance, adjust the position of timing switch to have the specified contact separation.

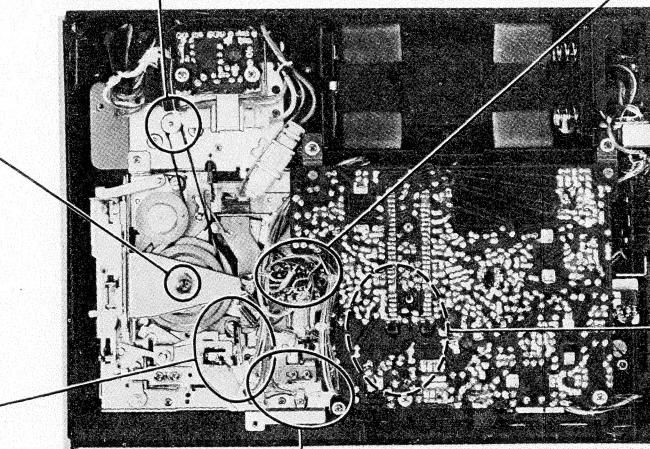
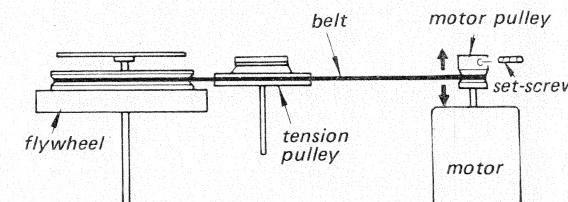
**Note:** After completing the adjustment, apply locking compound to adjustment screw.



#### MOTOR PULLEY HEIGHT ADJUSTMENT

##### — Stop Mode —

Loosen the set-screw, and adjust the height of motor pulley so that belt is straight.

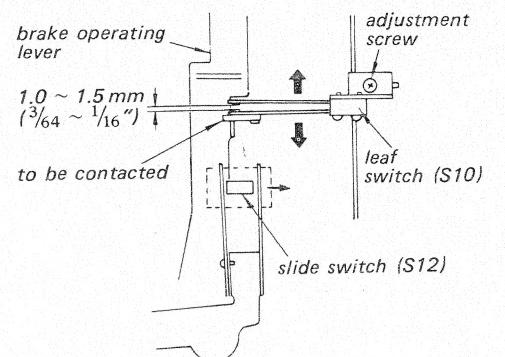


#### POWER SWITCH POSITION ADJUSTMENT

##### — Stop Mode —

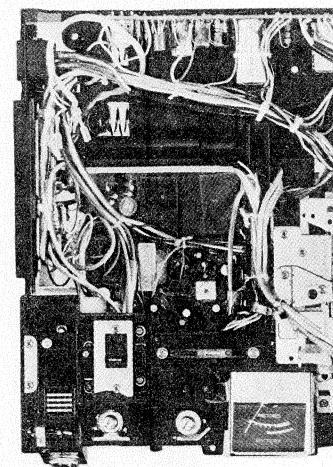
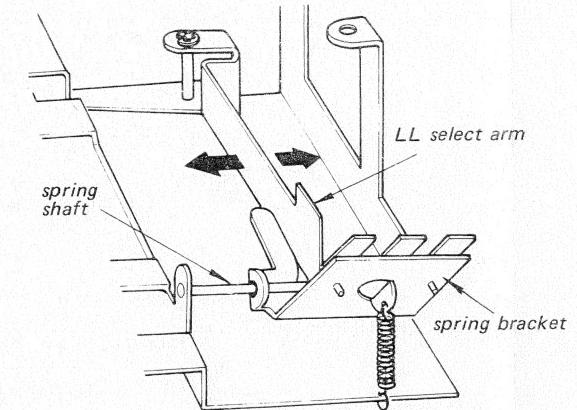
1. Loosen the adjustment screw, and adjust the position of leaf switch (S10) to have the specified contact separation.
2. When slowly depressing the forward button, check to see that the slide switch (S12) is switched over after leaf switch has been closed.

**Note:** After completing the adjustment, apply locking compound to adjustment screw.



#### LL SELECT ARM ADJUSTMENT

1. Switch the LL select lever to LL and NORMAL.
2. Adjust by bending the LL select arm so that the shaft-lengthwise play of the spring bracket is the same in LL mode and in NORMAL mode.

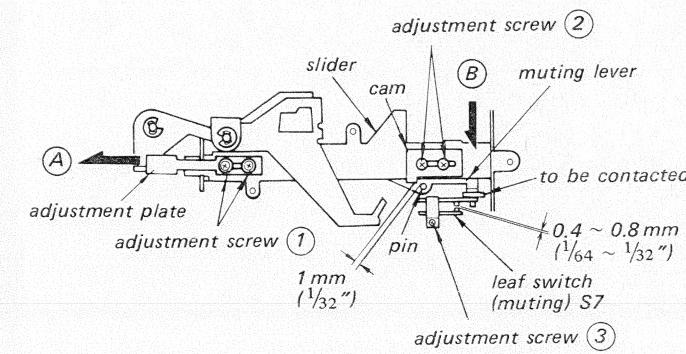


#### MUTING SWITCH POSITION ADJUSTMENT

##### — Stop Mode —

1. Push the adjustment plate to the full in the direction shown by the arrow (A), and tighten it with adjustment screws ①.
2. Loosen the adjustment screws ②, and adjust the position of cam for the specified clearance.
3. Loosen the adjustment screw ③, and adjust the position of leaf switch (S7) while pushing the slider in the direction shown by the arrow (B) so that muting lever pushes the leaf switch to have the specified contact separation.

**Note:** After completing the adjustment, apply locking compound to adjustment screws ①, ②, and ③.



#### PINCH ROLLER PRESSURE MEASUREMENT

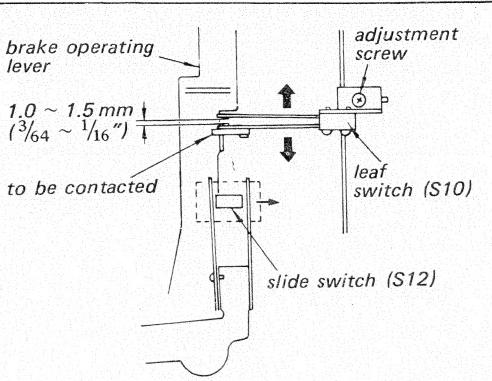
##### — Playback Mode —

1. Check to see that capstan is parallel to pinch roller.
2. Push pinch roller away from the capstan using tension gauge, as shown by the arrow (A). Allow pinch roller to return slowly. The pressure (tension) should be measured at the point where the pinch roller just contacts the capstan. If necessary, adjust pinch roller pressure by bending spring.

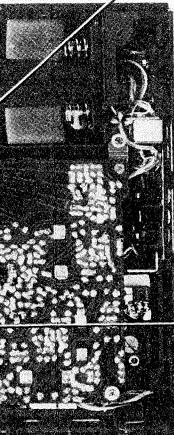
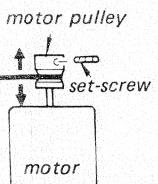
ten:  
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285  
(for  
cap:  
10.

**POWER SWITCH POSITION ADJUSTMENT****- Stop Mode -**

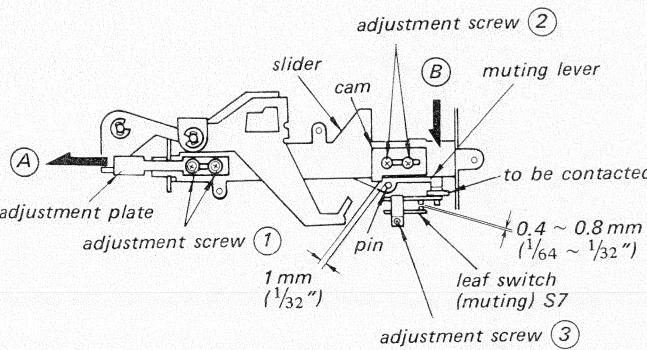
1. Loosen the adjustment screw, and adjust the position of leaf switch(S10) to have the specified contact separation.
  2. When slowly depressing the forward button, check to see that the slide switch(S12) is switched over after leaf switch has been closed.
- Note:** After completing the adjustment, apply locking compound to adjustment screw.



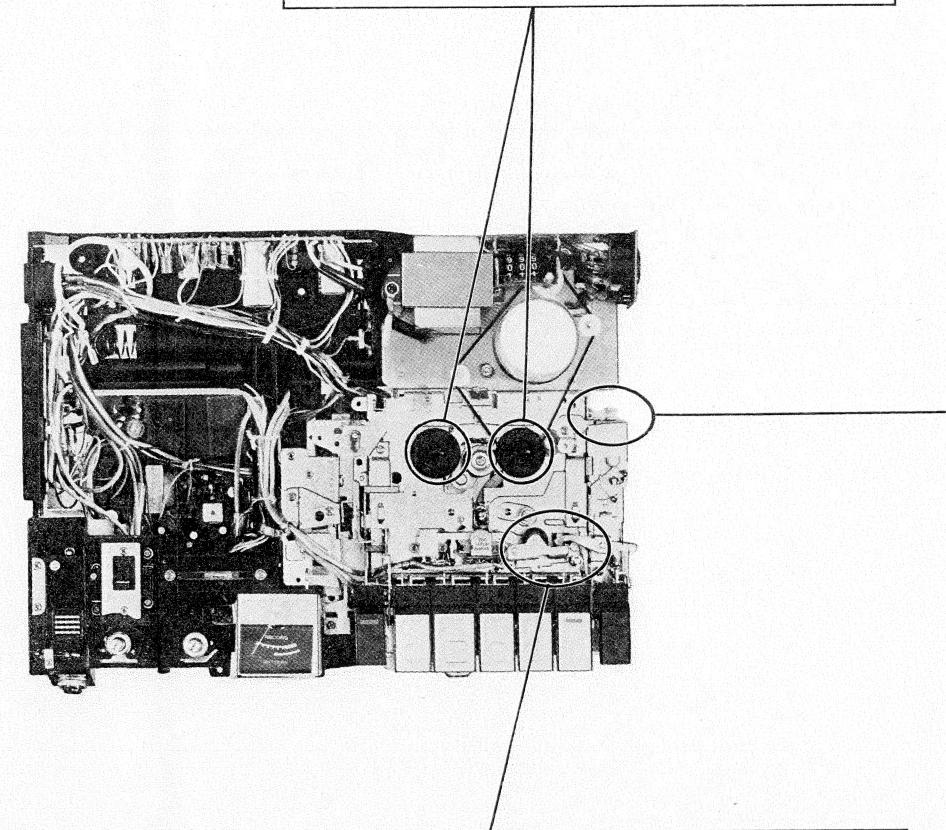
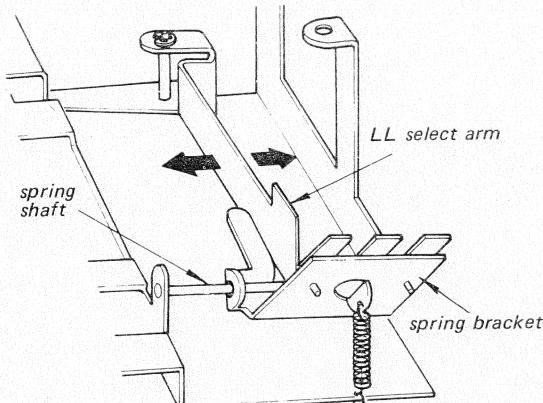
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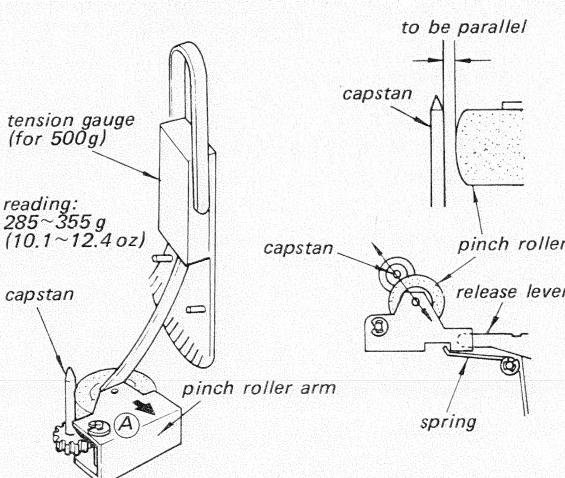
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t screws**LL SELECT ARM ADJUSTMENT**

1. Switch the LL select lever to LL and NORMAL.
2. Adjust by bending the LL select arm so that the shaft-lengthwise play of the spring bracket is the same in LL mode and in NORMAL mode.

**PINCH ROLLER PRESSURE MEASUREMENT****- Playback Mode -**

1. Check to see that capstan is parallel to pinch roller.
2. Push pinch roller away from the capstan using tension gauge, as shown by the arrow ④. Allow pinch roller to return slowly. The pressure (tension) should be measured at the point where the pinch roller just contacts the capstan. If necessary, adjust pinch roller pressure by bending spring.

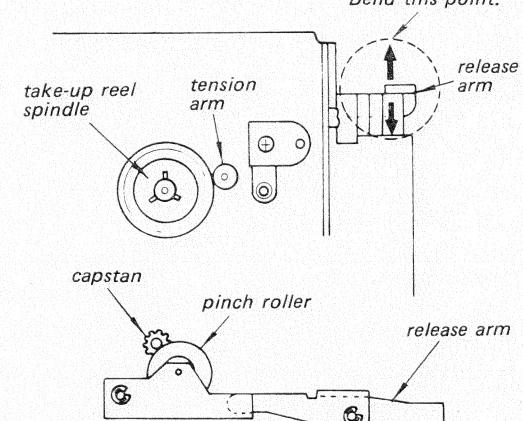
**PAUSE TIMING CHECK****- Playback Mode -**

1. When depressing the PAUSE button, check to see that
  - a) pinch roller releases from capstan.
  - b) tension arm releases from take-up reel spindle.
2. When releasing the PAUSE button, check to see that
  - a) tension arm contacts take-up reel spindle.
  - b) pinch roller contacts capstan.

**Note:** Above functions a) and b) may be found in the same time.

If necessary, bend the release arm in the direction shown by the arrow.

Bend this point.



## SECTION 4

### ELECTRICAL ADJUSTMENTS AND MEASUREMENTS

#### PRECAUTION

1. Clean the following parts with alcohol moistened swab:
  - Record/playback head
  - Erase head
  - Capstan
  - Pinch roller
  - Rubber belts
  - Idlers
2. Demagnetize record/playback head with a head demagnetizer.  
(Do not use magnetized screwdriver for adjustments).
3. After completing the adjustments, apply locking compound to adjustment parts.
4. Adjustments should be performed in the order listed in this service manual.
5. Adjustments and measurements should be performed with rated power supply voltage unless otherwise specified.

#### Test Equipment/Tools Required

audio oscillator (af osc)  
 VTVM  
 DC ammeter  
 DC voltmeter  
 monaural cassette-corder for chromium dioxide tape  
 digital frequency counter  
 or speed checker (SONY LFM-30)  
 400 Hz bandpass filter  
 resistors 300  $\Omega$ , 600  $\Omega$ , 100 k $\Omega$ , 8  $\Omega$  (4 W)  
 attenuator  
 wow meter  
 distortion meter  
 SONY test tapes  
 P-4-A81 (6.3 kHz, -10 dB)  
 P-4-L81 (333 Hz, 0 dB)  
 SPC-4 (1 kHz, 0 dB)  
 WS-48 (3 kHz, 0 dB)  
 blank tape cassette (completely erased)  
 normal  
 chromium dioxide

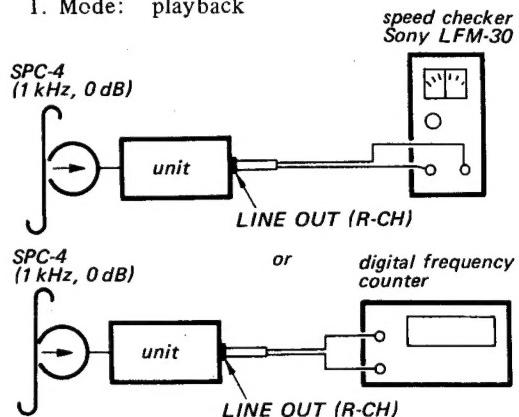
#### 1. Tape Speed Adjustment

##### Settings:

LL/NORMAL switch ..... NORMAL  
 TAPE SELECT switch ..... NORMAL  
 Power source ..... 6 V DC

##### Procedure:

1. Mode: playback



Adjust R402 for 1000 Hz reading on the frequency counter or for 0 % on the speed checker.

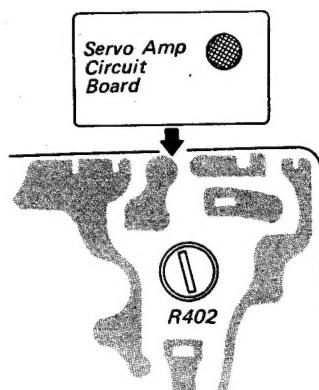
##### Specifications:

- 1.

Speed checker	Digital frequency counter
-2.5 ~ +3 %	975 ~ 1030 Hz

2. Frequency difference between beginning and end of tape should be within 1% (10 Hz).

##### Adjustment Location:



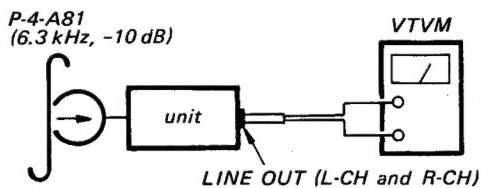
## 2. Record/Playback Head Azimuth Adjustment

### Settings:

LL/NORMAL switch ..... NORMAL  
TAPE SELECT switch ..... NORMAL

### Procedure:

1. Mode: playback



Adjust the adjusting screw (Fig. B) to obtain maximum reading on the VTVM.

### Notes:

- A few peaks may appear as illustrated in Fig. A, take the biggest peak.
- If the peak values for L-CH and R-CH are not obtained in the same azimuth angle, take the mid angle between them and the deviation should be within 1 dB.

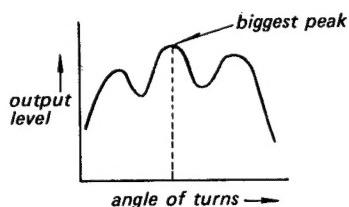


Fig. A

### Adjustment Location:



Fig. B

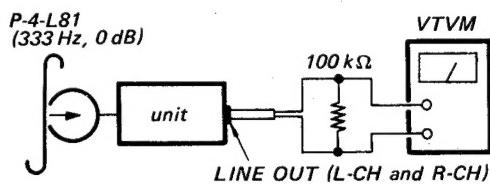
## 3. Playback Level Adjustment

### Settings:

LL/NORMAL switch ..... NORMAL  
TAPE SELECT switch ..... NORMAL

### Procedure:

1. Mode: playback



Select the resistor R113, R213 and R114, R214 for 2 dB (0.95 V) reading on the VTVM.

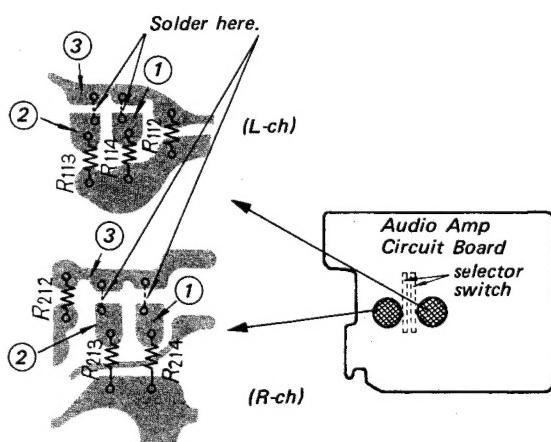
**Note:** In case the LINE OUTput level is higher than the specified value, solder the point ② and ③.

In case the LINE OUTput level is lower than the specified value, solder the point ① and ③.

### Specifications:

- (1) 2 dB ± 2 dB (0.775 ~ 1.2 V)
- (2) Level difference between L-CH and R-CH should be within 3 dB.

### Adjustment Location:



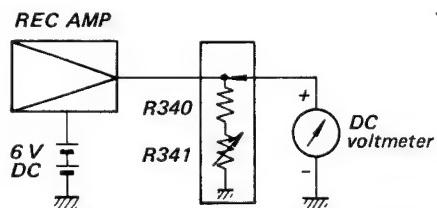
#### 4. B+ Voltage Adjustment for Record Bias Oscillator

##### Settings:

LL/NORMAL switch ..... NORMAL  
TAPE SELECT switch ..... NORMAL

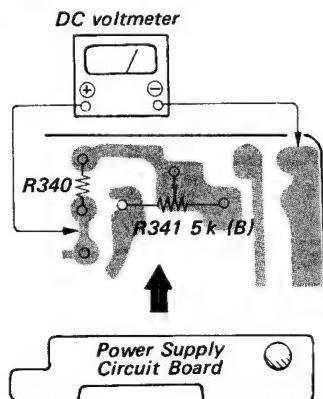
##### Procedure:

1. Mode: record



Adjust R341 for  $4.5V \pm 0.1V$  reading on the voltmeter.

##### Adjustment Location:



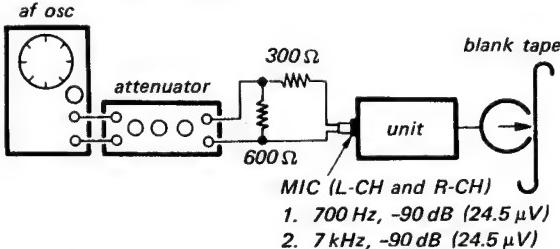
#### 5. Record Bias Adjustment

##### Settings:

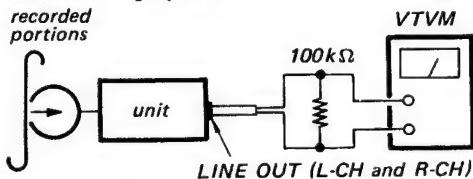
LL/NORMAL switch ..... NORMAL  
TAPE SELECT switch ..... NORMAL

##### Procedure:

1. Mode: record



2. Mode: playback



Be sure that the level difference between 7 kHz signal and 700 Hz signal is within the specified value.

##### Specifications:

	Frequency	Level Difference
(1)	700Hz	$0 \text{ dB} \pm \frac{2}{4} \text{ dB}$
	7 kHz	

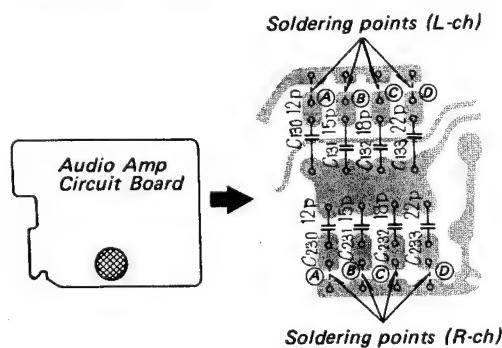
2. Level difference between the L-CH and R-CH should be within 3 dB.

Note: If necessary, adjust by soldering points (A), (B), (C) or (D).

In case the output level at 7 kHz is higher than at 700 Hz, increase capacitance value.

In case the output level at 7 kHz is lower than at 700 Hz, decrease capacitor capacitance value.

##### Adjustment Location:

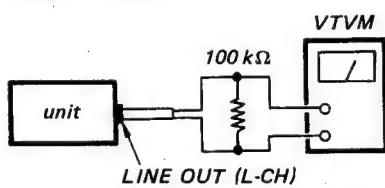


**6. Trap Coil Adjustment****Settings:**

LL/NORMAL switch ..... LL  
 TAPE SELECT switch ..... NORMAL

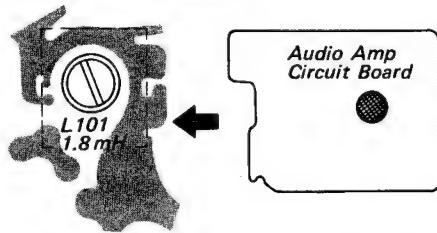
**Procedure:**

1. Mode: record



Adjust the coil L101 for minimum reading on the VTVM.

Specification: less than -20 dB (77 mV)

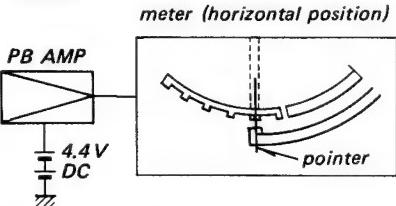
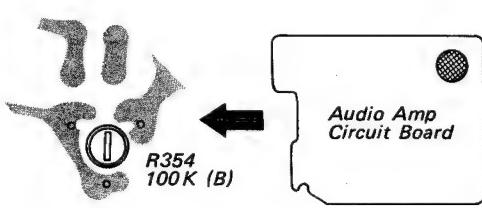
**Adjustment Location:****7. Battery Indicator Calibration****Settings:**

TONE control ..... HIGH max  
 VOLUME control ..... MIN  
 Power source ..... 4.4 V DC

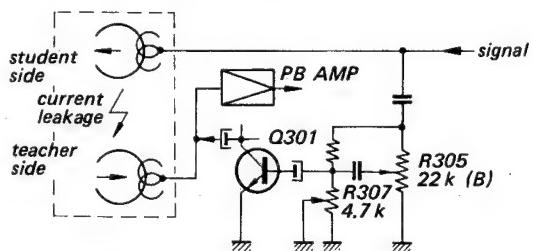
**Procedure:**

1. Mode: playback

Adjust R354 so that pointer indicates as shown.

**Adjustment Location:****8. Cross Talk Canceling Adjustment**

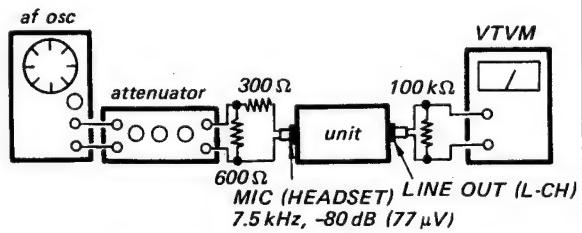
**Note:** The purpose of this adjustment is to cancel current leakage from student side (record) to teacher side (playback).

**Settings:**

LL/NORMAL switch ..... LL  
 TAPE SELECT switch ..... NORMAL

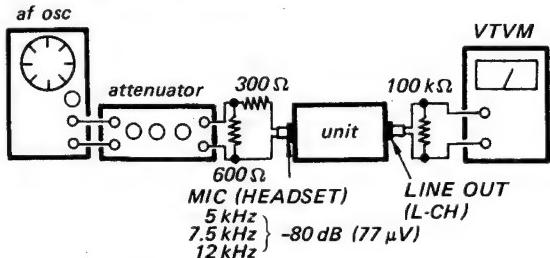
**Procedure:**

1. Mode: record



Adjust R305 and R307 for minimum reading on the VTVM.

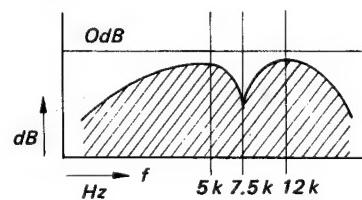
2. Mode: record

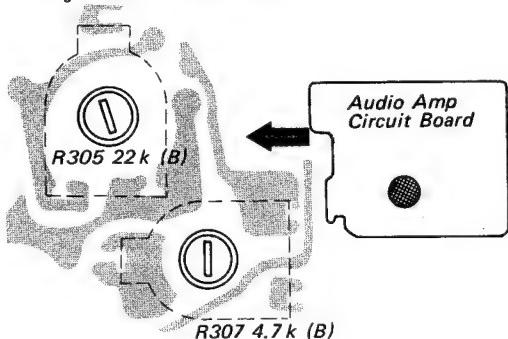
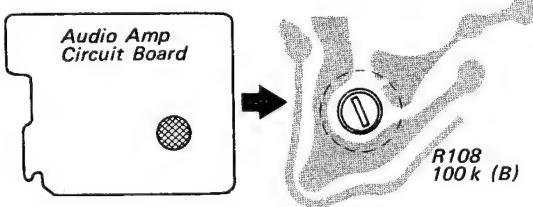


Be sure that the LINE OUTput level is within the specified value.

**Specifications:**

- less than 0 dB (0.775 V) at 5 kHz and 12 kHz signals
- less than -5 dB (0.44 V) at 7.5 kHz signal.

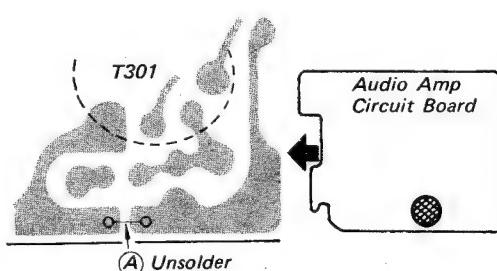


**Adjustment Location:****Adjustment Location:****9. AGC Stereo Balance Adjustment****Settings:**

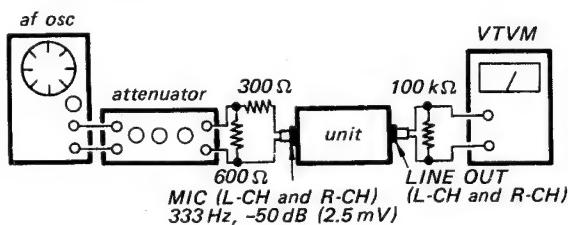
LL/NORMAL switch ..... NORMAL

**Procedure:**

1. Unsolder the point A.



2. Mode: record



Adjust R108 to obtain the same output level for both L-CH and R-CH.

**Specifications:**

- a)  $2.5 \text{ dB} \pm 2 \text{ dB}$  ( $0.82 \sim 1.3 \text{ V}$ )
- b) level difference between the L-CH and R-CH should be within  $0.5 \text{ dB}$ .

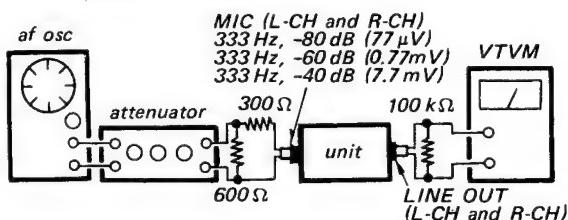
3. After completing the adjustment, solder the point A.

**10. AGC Level Measurement****Settings:**

LL/NORMAL switch ..... NORMAL

**Procedure:**

1. Mode: record



Be sure that LINE OUTput level is as specified.

**Specifications:**

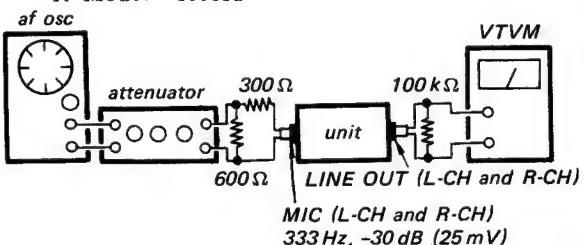
MIC input level	LINE OUTput level
-80 dB (77 μV)	-8 dB ± 2 dB (0.25 ~ 0.39 V)
-60 dB (0.77 mV)	1 dB ± 2 dB (0.69 ~ 1.1 V)
-40 dB (7.7 mV)	4 dB ± $\frac{3}{2}$ dB (0.95 ~ 1.7 V)

**11. AGC Recovery Time Measurement****Settings:**

LL/NORMAL switch . . . . . NORMAL

**Procedure:**

1. Mode: record



2. Suddenly decrease the input signal to -60 dB (0.77 mV).
3. Measure the recovery time while the output level increases 10 dB from -30 dB (25 mV) to -20 dB (77 mV).

Specification: 20 to 120 seconds

**12. Playback Signal-to-Noise Ratio Measurement****Settings:**

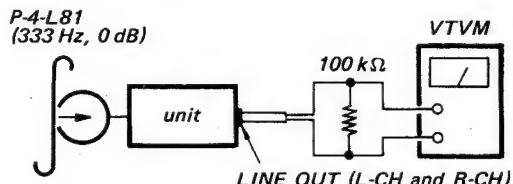
LL/NORMAL switch . . . . . NORMAL

TAPE SELECT switch . . . . . NORMAL

Power source . . . . . 6 V DC and rated AC voltage

**Procedure:**

1. Mode: playback



2. Read the L-CH and R-CH LINE OUTput levels on the VTVM.
3. When depress the PAUSE button, read the noise level on the VTVM, and make sure that difference between the noise level and the level at step 2.

**Specifications:**

- (1) greater than 46 dB with battery.
- (2) greater than 42 dB with household current.

**13. Overall Signal-to-Noise Ratio Measurement****Settings:**

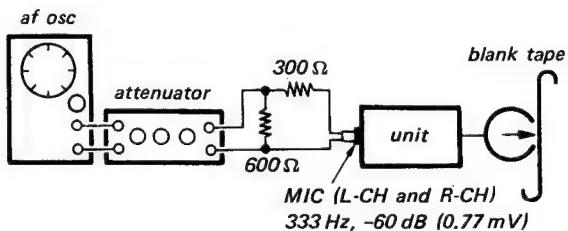
LL/NORMAL switch . . . . . NORMAL

TAPE SELECT switch . . . . . NORMAL

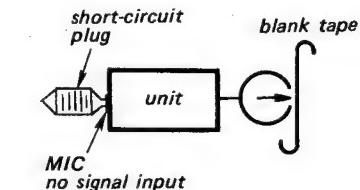
Power source . . . . . 6 V DC and rated AC voltage

**Procedure:**

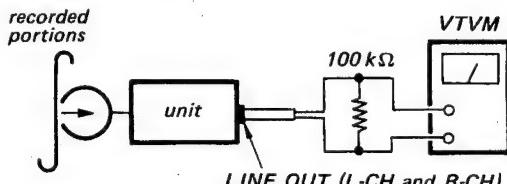
1. Mode: record



2. Mode: record



3. Mode: playback



Make sure that the level difference between the 333 Hz and no signal portions are as specified.

**Specifications:**

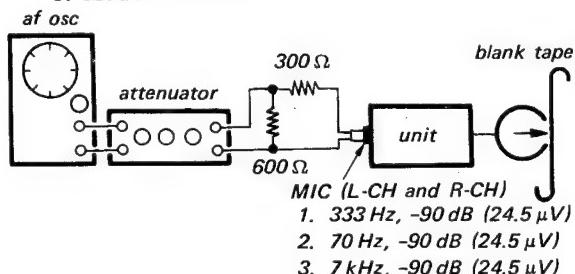
- (1) greater than 45 dB with battery
- (2) greater than 40 dB with household current.

**14. Overall Frequency Response Measurement****Settings:**

LL/NORMAL switch ..... NORMAL  
TAPE SELECT switch ..... NORMAL or CrO<sub>2</sub>

**Procedure:**

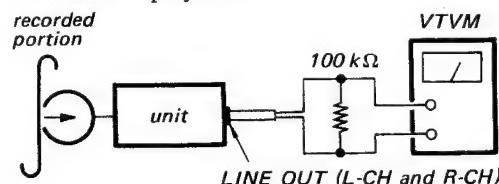
1. Mode: record



**Note:** Use blank tape as follows;

TAPE SELECT switch	Using cassette tape
NORMAL	normal
CrO <sub>2</sub>	chromium dioxide

2. Mode: playback



Be sure that the level deviation of each frequency relative to 333 Hz signal is as specified.

**Specifications:**

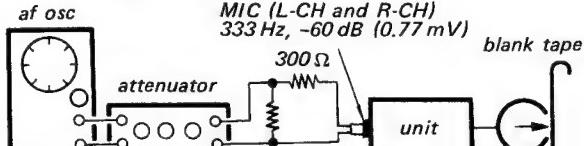
Mode	TAPE SELECT switch mode	Record signal	Playback LINE OUT signal
NORMAL record	NORMAL	70 Hz	0 dB ± $\frac{1}{2}$ dB (0.19~0.775 V)
		7 kHz	0 dB ± $\frac{2}{3}$ dB (0.49~0.95 V)
NORMAL playback	CrO <sub>2</sub>	7 kHz	0 dB ± $\frac{4}{3}$ dB (0.55~1.1 V)
		70 Hz	0 dB ± $\frac{9}{16}$ dB (0.14~0.775 V)
LL record	NORMAL	7 kHz	0 dB ± $\frac{2}{3}$ dB (0.39~0.95 V)
		70 Hz	0 dB ± $\frac{9}{16}$ dB (0.14~0.775 V)

**15. Overall Distortion Measurement****Settings:**

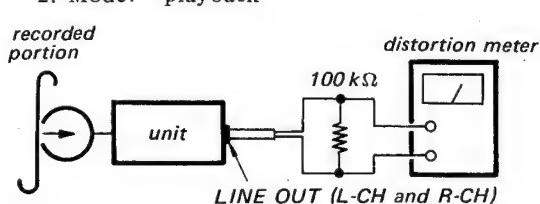
LL/NORMAL switch ..... NORMAL  
TAPE SELECT switch ..... NORMAL

**Procedure:**

1. Mode: record



2. Mode: playback



Measure the distortion.

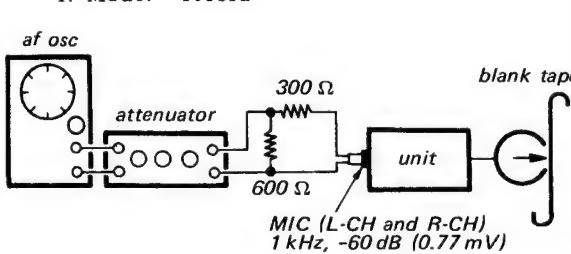
Specification: less than 4%

**16. Overall Maximum Output Measurement****Settings:**

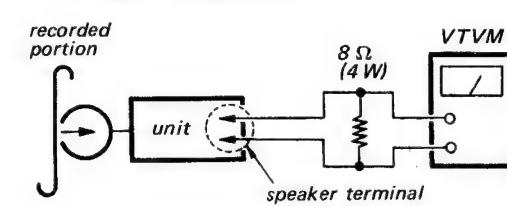
LL/NORMAL switch ..... NORMAL  
TAPE SELECT switch ..... NORMAL  
TONE control ..... HIGH max  
VOLUME control ..... MAX  
Power supply ..... 6 V DC and rated AC power voltage

**Procedure:**

1. Mode: record



2. Mode: playback



Measure the output level.

**Specification:**

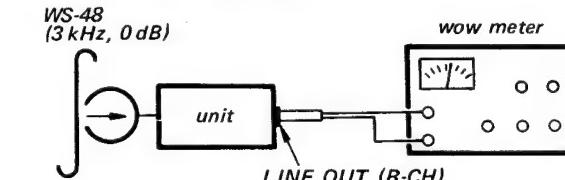
Power Supply	Output Level
DC	more than 11 dB (2.8 V)
AC	more than 10 dB (2.5 V)

**17. Wow and Flutter Measurement****Settings:**

LL/NORMAL switch ..... NORMAL  
TAPE SELECT switch ..... NORMAL

**Procedure:**

1. Mode: playback



Measure wow and flutter for beginning and end portions of tape (WS-48).

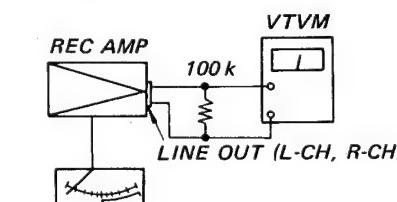
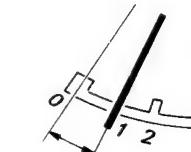
Specification: less than 0.34% (RMS)

**18. Bias Current Leakage Measurement****Settings:**

MICROPHONE switch ..... OFF

**Procedure:**

1. Mode: record (No signal)



Be sure that the L-CH and R-CH LINE OUTput levels are as specified.

**Specifications:**

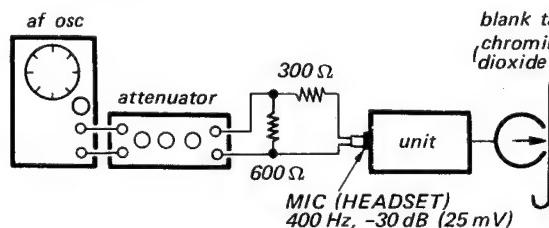
- less than -12 dB (0.19 V)
- The level meter indication should be within "1" on the scale.

**19. Erase Ratio Measurement (1)****Settings:**

LL/NORMAL switch ..... LL  
 TAPE SELECT switch ..... CrO<sub>2</sub>  
 LL BALANCE control ..... STUDENT max

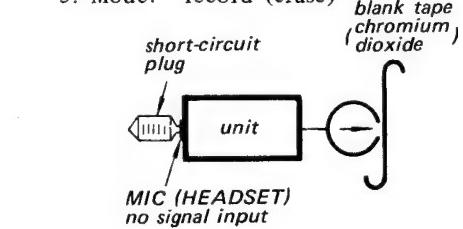
**Procedure:**

1. Mode: record

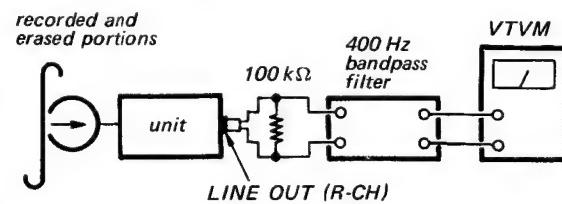


2. Rewind a half of the signal recorded portion of the tape cassette.

3. Mode: record (erase)



4. Mode: playback



Make sure that the level difference between two portions is as specified.

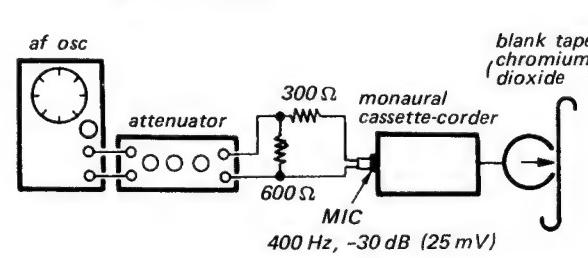
Specification: 60 dB or more

**20. Erase Ratio Measurement (2)****Settings:**

LL/NORMAL switch ..... NORMAL  
 TAPE SELECT switch ..... CrO<sub>2</sub>  
 Prepare a monaural cassette-corder using chromium dioxide tape.

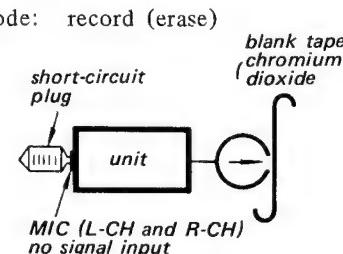
**Procedure:**

1. Mode: record

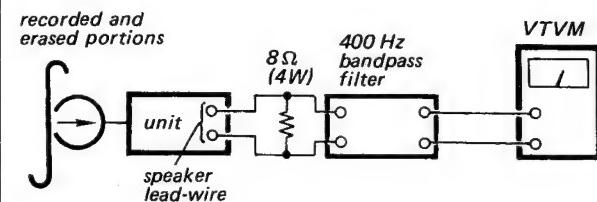


2. Rewind a half of the signal recorded portion of the tape cassette.

3. Mode: record (erase)



4. Mode: playback



Adjust the VOLUME control at signal recorded portion for 0 dB (0.775 V) reading on the VTVM, and make sure that level difference between two portions is as specified.

Specification: 60 dB or more

**21. Teacher Channel Erasure Measurement**

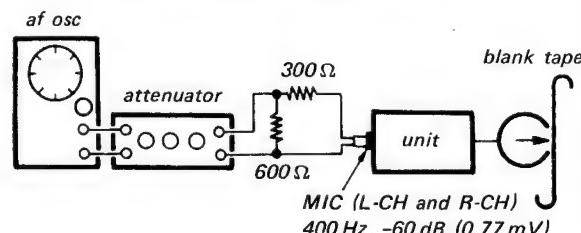
In LL record mode, the student channel is in record mode and the teacher channel in playback mode. The teacher channel is slightly erased by the erase head of the student channel. This measurement is to know how much erased the teacher channel is by adjacent erase head.

**Settings:**

TAPE SELECT switch ..... NORMAL

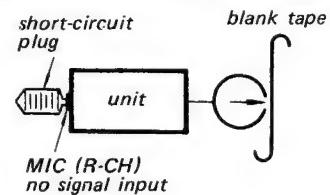
**Procedure:**

1. Mode: record  
LL/NORMAL switch: NORMAL

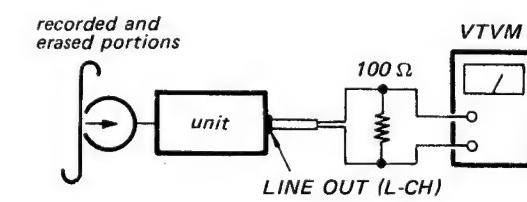


2. Rewind a half of the signal recorded portion of tape cassette.

3. Mode: record (erase)  
LL/NORMAL switch: LL



4. Mode: playback



Make sure that the level difference between two portions is as specified.

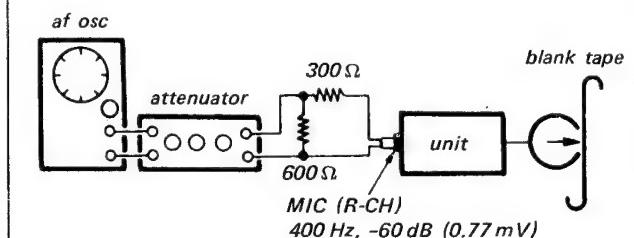
Specification: less than 2 dB

**22. Cross Talk (Between Channels) Measurement****Settings:**

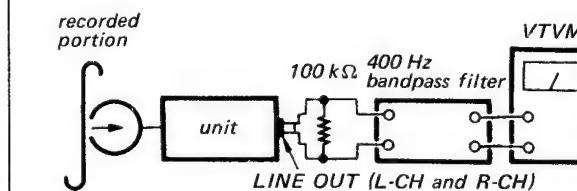
LL/NORMAL switch ..... LL  
 TAPE SELECT switch ..... NORMAL

**Procedure:**

1. Mode: record



2. Mode: playback



a) Move the LL BALANCE control fully to STUDENT, and read the VTVM indication at R-CH LINE OUT.

b) Move the LL BALANCE control fully to TEACHER, and read the VTVM indication at L-CH LINE OUT.

Make sure that the level difference between step a) and step b) is as specified.

Specification: 25 dB or more

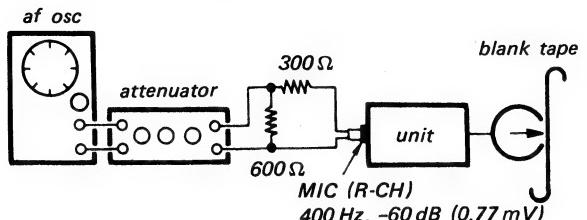
## SECTION 5 DIAGRAMS

**23. Cross Talk (Between Tracks) Measurement**
**Settings:**

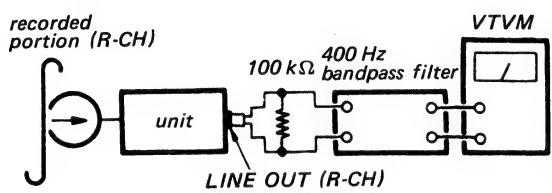
LL/NORMAL switch.....NORMAL  
TAPE SELECT switch .....NORMAL

**Procedure:**

1. Mode: record



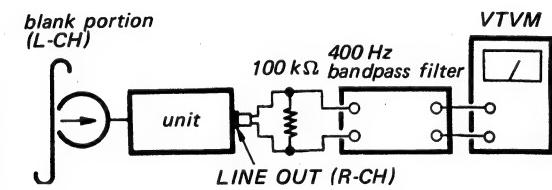
2. Mode: playback



Read the VTVM indication.

3. Mode: playback

**Note:** Turn over the tape cassette.



Read the VTVM indication.

4. Make sure that the level difference between step 2 and step 3 is as specified.

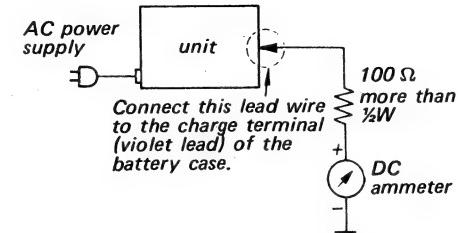
Specification: 55 dB or more

**24. Charge Current Check**
**Settings:**

POWER switch .....OFF

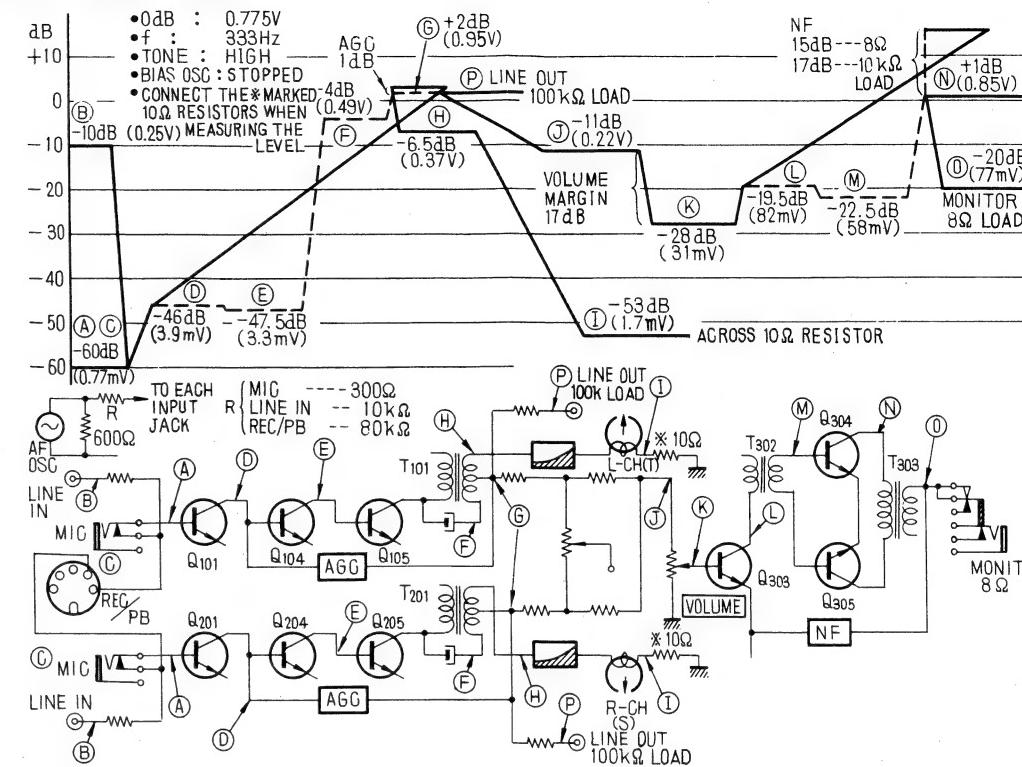
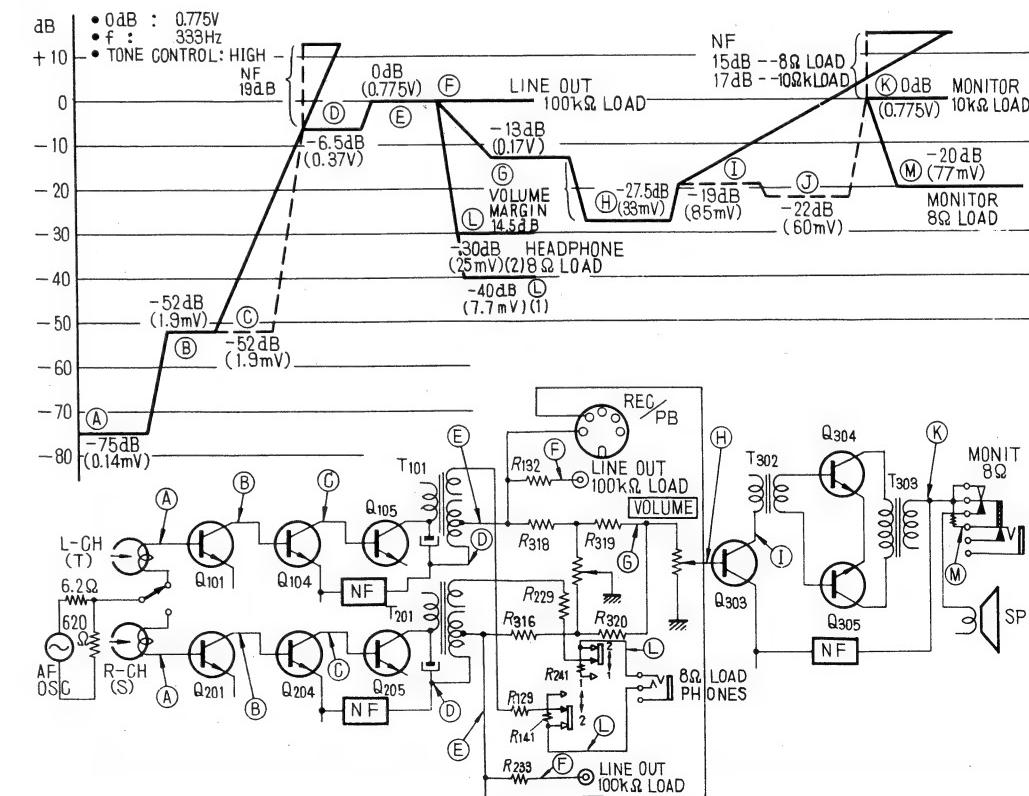
**Procedure:**

1. Test Setup



2. Make sure that the reading is as specified.

Specification: 45 ~ 75 mA.

**5-1. LEVEL DIAGRAM**
**- NORMAL Record Mode -**

**- Playback Mode -**


## SECTION 5 DIAGRAMS

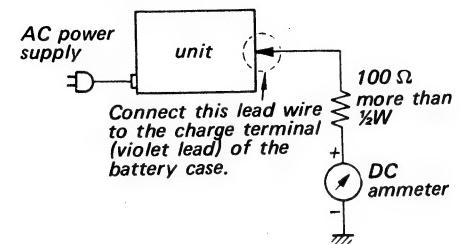
### 24. Charge Current Check

#### Settings:

POWER switch ..... OFF

#### Procedure:

##### 1. Test Setup

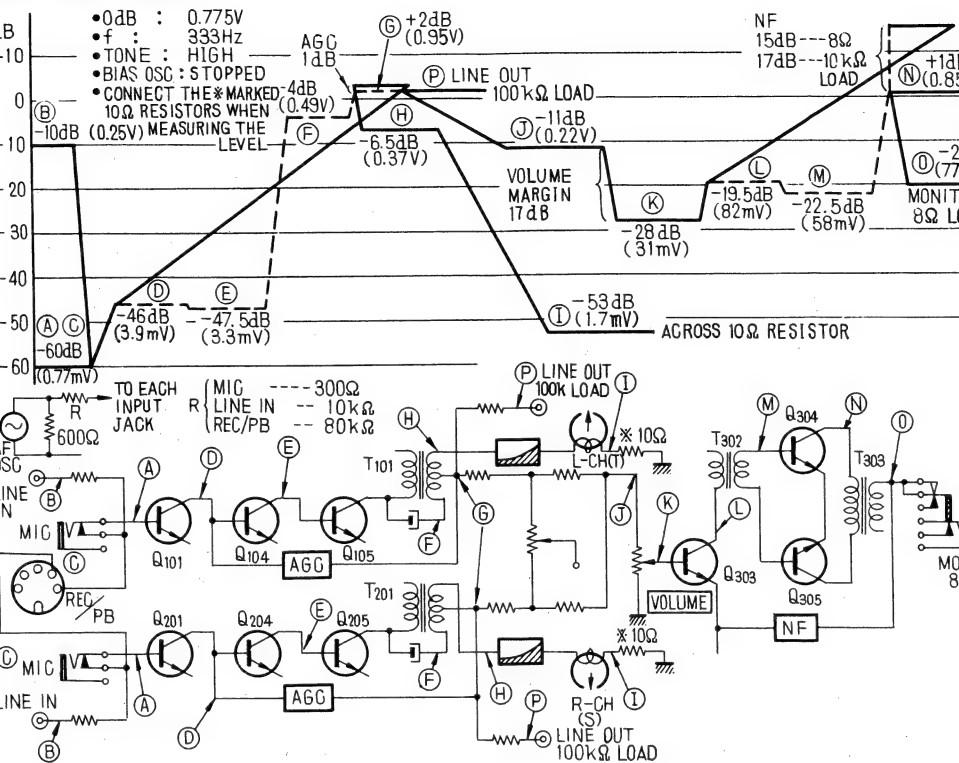


##### 2. Make sure that the reading is as specified.

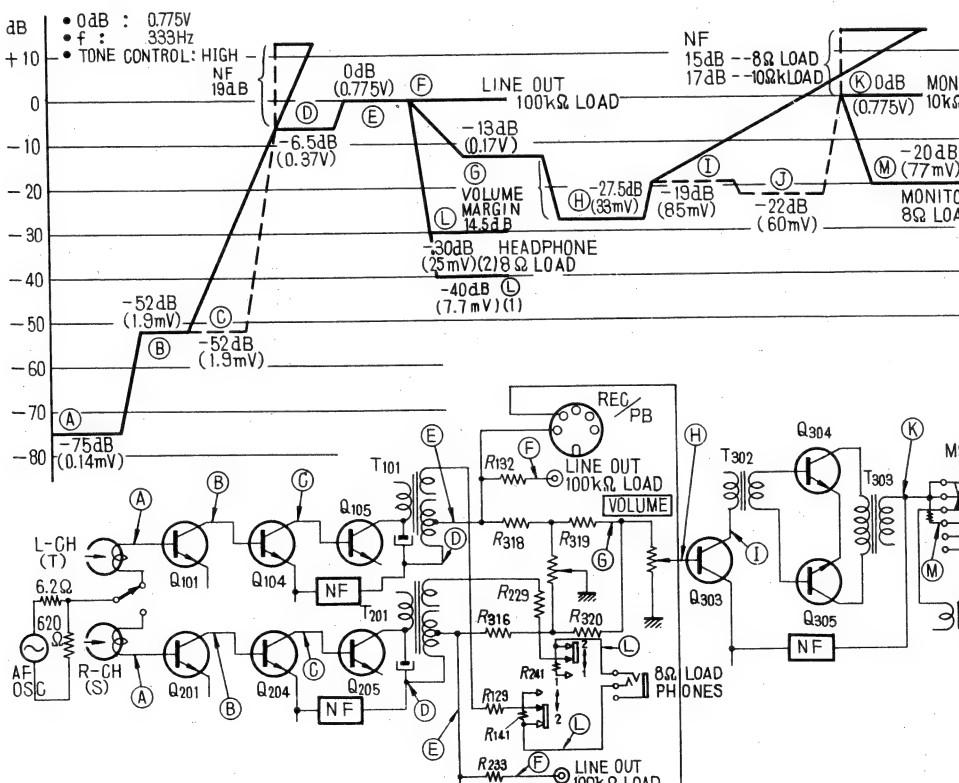
Specification: 45 ~ 75 mA.

### 5-1. LEVEL DIAGRAM

#### - NORMAL Record Mode -

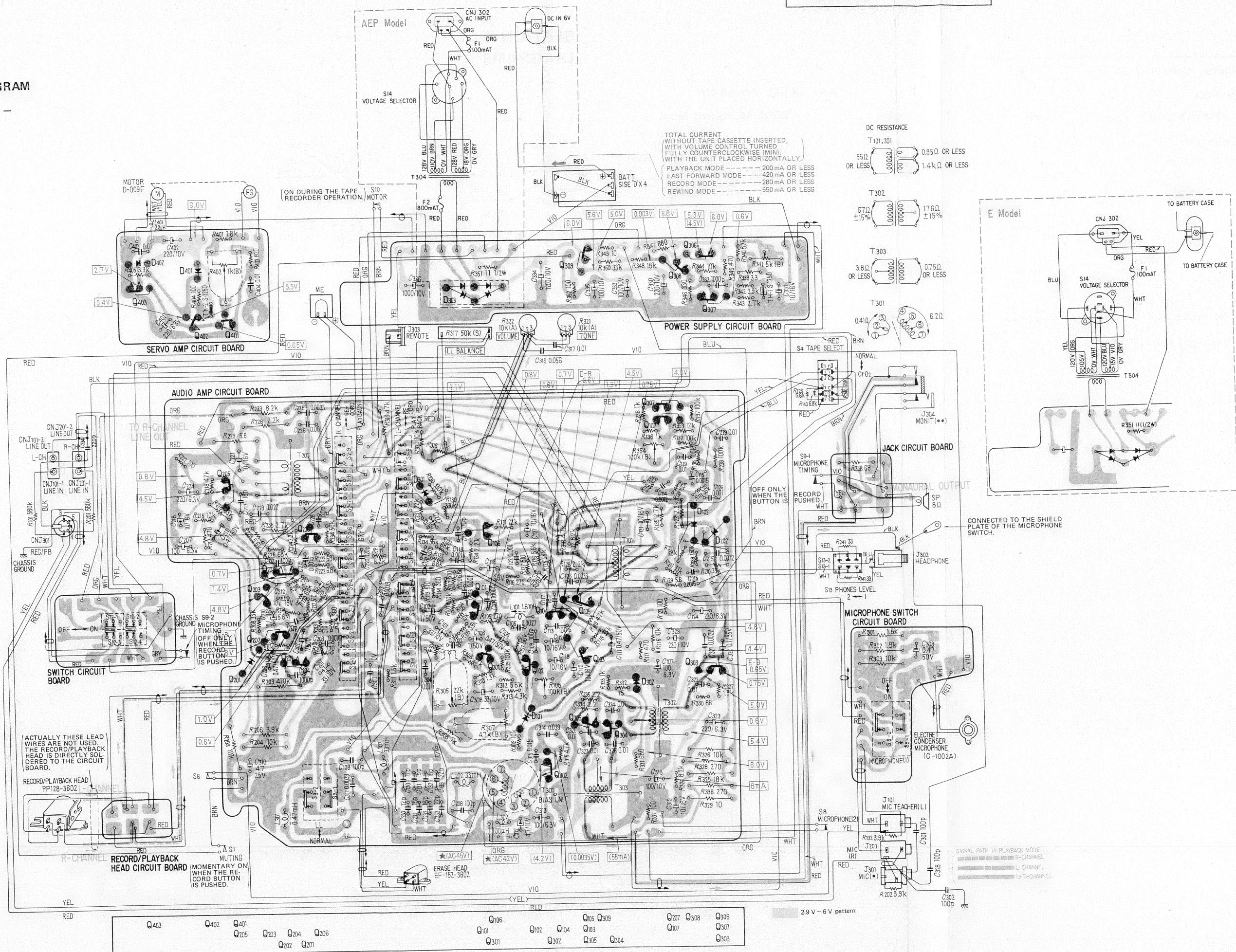


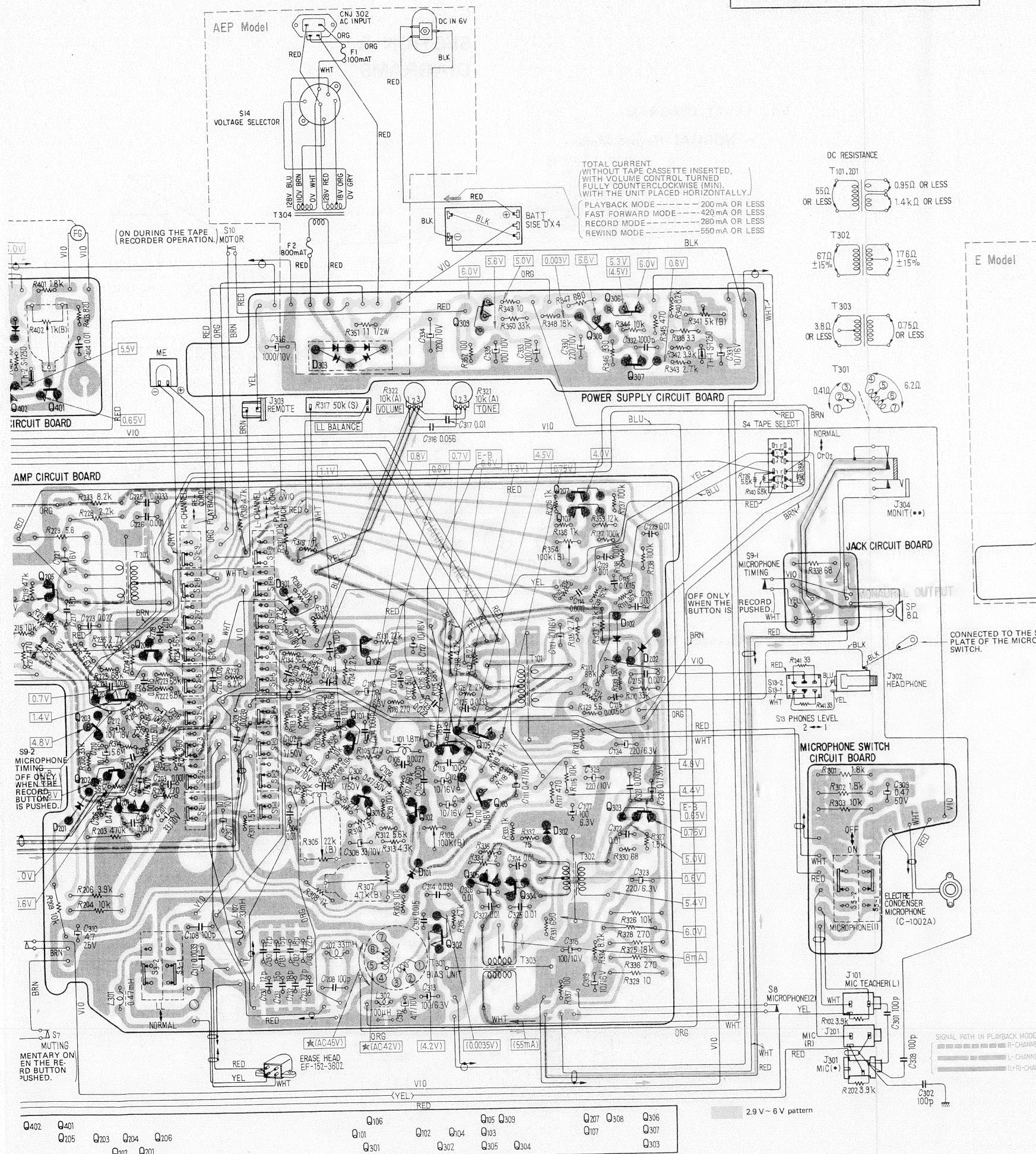
#### - Playback Mode -



## 5-2. MOUNTING DIAGRAM

— Conductor Side —



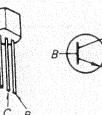
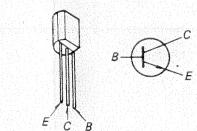


Semiconductor Lists

Q101 (Q201) ...	2SC1361	D101 (D201)....	1T-40
Q102 (Q202) ...	2SC1363	D102 (D202)....	1T-40
Q103 (Q203) ...	2SC1363	D301 .....	1T-22
Q104 (Q204) ...	2SC1363	D302 .....	VD-1123
Q105 (Q205) ...	2SC1363	D303 .....	SIRB-10
Q106 (Q206) ...	2SC1363	D401 .....	1T-40
Q107 (Q207) ...	2SC1363	D402 .....	10D-2
Q301 .....	2SC1361	Th1, 2 .....	S-1250
Q302 .....	2SC1474		
Q303 .....	2SC1363		
Q304 .....	2SC1474		
Q305 .....	2SC1474		
Q306 .....	2SA772		
Q307 .....	2SC1363		
Q308 .....	2SC1363		
Q309 .....	2SC1363		
Q401 .....	2SC1363		
Q402 .....	2SB475		
Q403 .....	2SC1474		

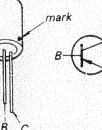
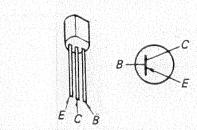
2SC1361  
2SC1363

2SC1474

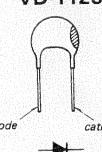
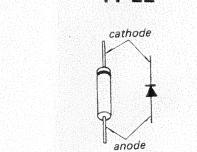


2SA772

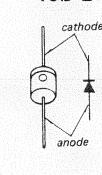
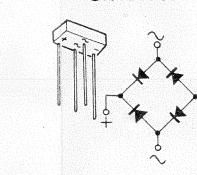
2SB475



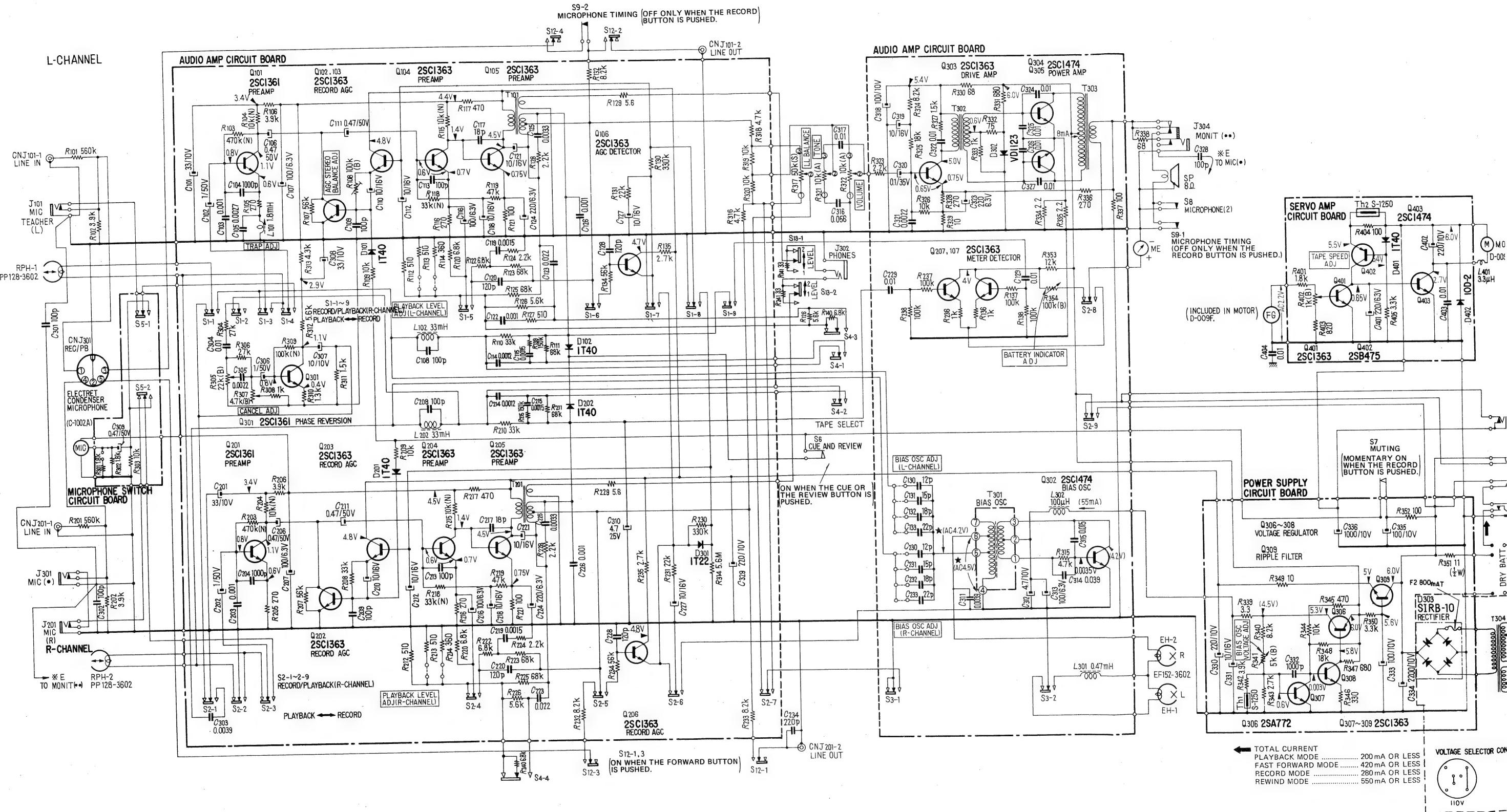
1T-40  
1T-22



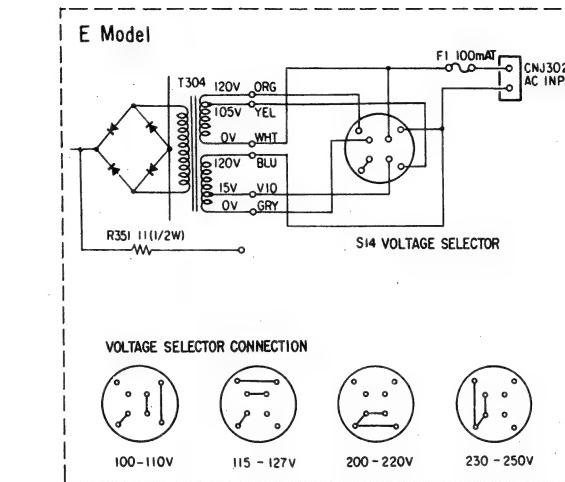
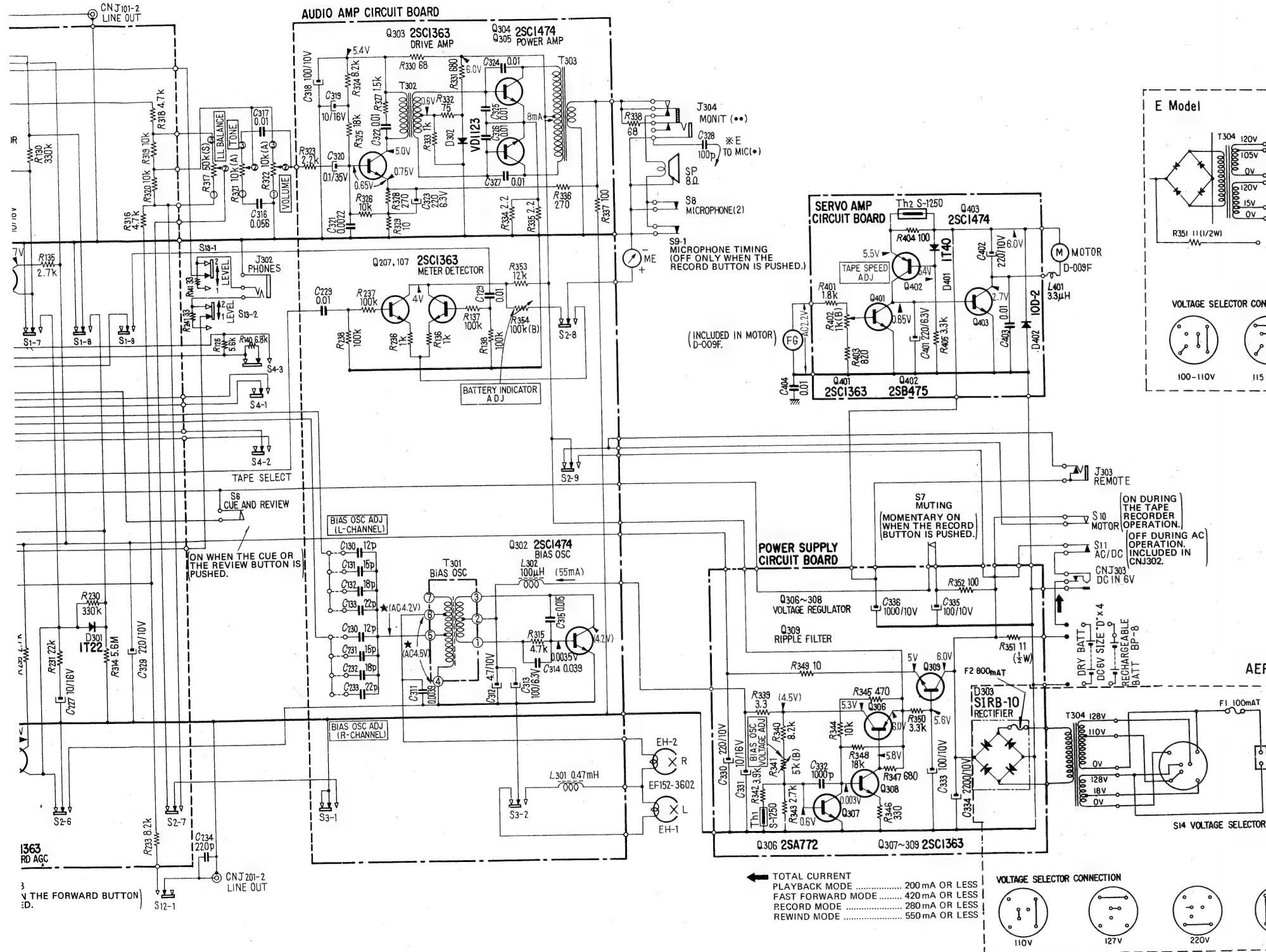
SIRB-10



### **5-3. SCHEMATIC DIAGRAM**



3 [OFF ONLY WHEN THE RECORD  
BUTTON IS PUSHED.]



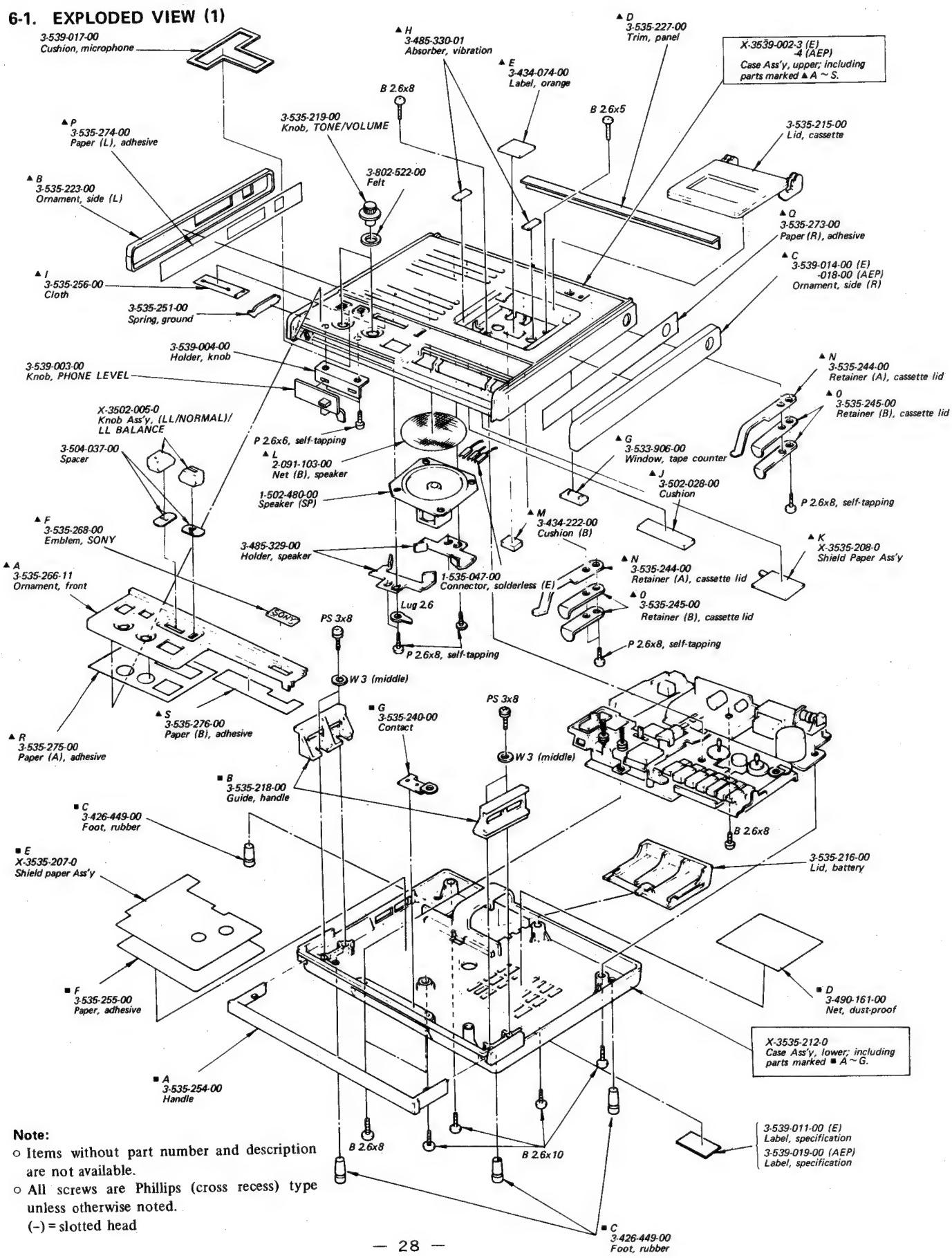
- Note:**
- All resistors are in  $\Omega$ ,  $\frac{1}{4}W$  and carbon type unless otherwise indicated.  $k = 1000$ .
  - All capacitors are in  $\mu F$  unless otherwise indicated.  $p = \mu\mu$ .
  - Letter in ( ) suffixed to variable resistor value indicates characteristics.
  - (---) : chassis ground
  - (N) : low noise resistor
  - Voltage values shown are measured to chassis ground with a voltmeter ( $20 k\Omega/V$ ).  
no mark : playback mode  
(---) : record mode
  - Voltage values between the emitter and the base of transistors are measured with  $2.5 V$  range.
  - Voltage values marked with \* are measured with VTVM.
  - Connect R301 resistor into the circuit when a red mark microphone is used.

**Switch mode:**

Ref. No.	Switch	Mode
S1-1-1-9	record/playback (L-channel)	playback
S2-1-2-9	record/playback (R-channel)	playback
S3-1-3-2	LL/NORMAL	NORMAL
S4-1-4-4	TAPE SELECT (CrO <sub>2</sub> /NORMAL)	NORMAL
S5-1-5-2	MICROPHONE (1) (ON when the built-in microphone is used.)	OFF
S6	CUE and REVIEW (ON when the CUE or the REVIEW button is pushed.)	OFF
S7	muting (momentary ON when the record button is pushed.)	OFF
S8	MICROPHONE (2) (OFF when the built-in microphone is used. jointed to S5.)	ON
S9-1-9-2	microphone timing (this switch turns OFF to stop the output signals through REC/PB connector in record mode.)	ON
S10	motor (ON during the tape recorder operation.)	OFF
S11	AC/DC (OFF during AC operation. included in CNJ302.)	DC
S12-1-12-4	LINE OUT and REC/PB (ON when the forward button is pushed.)	OFF
S13	PHONES LEVEL (1/2)	2
S14	voltage selector	E: 100-110V, 115-127V 200-220V, 230-250V AEP: 110V, 127V, 220V, 240V

## SECTION 6 EXPLODED VIEWS AND PACKING

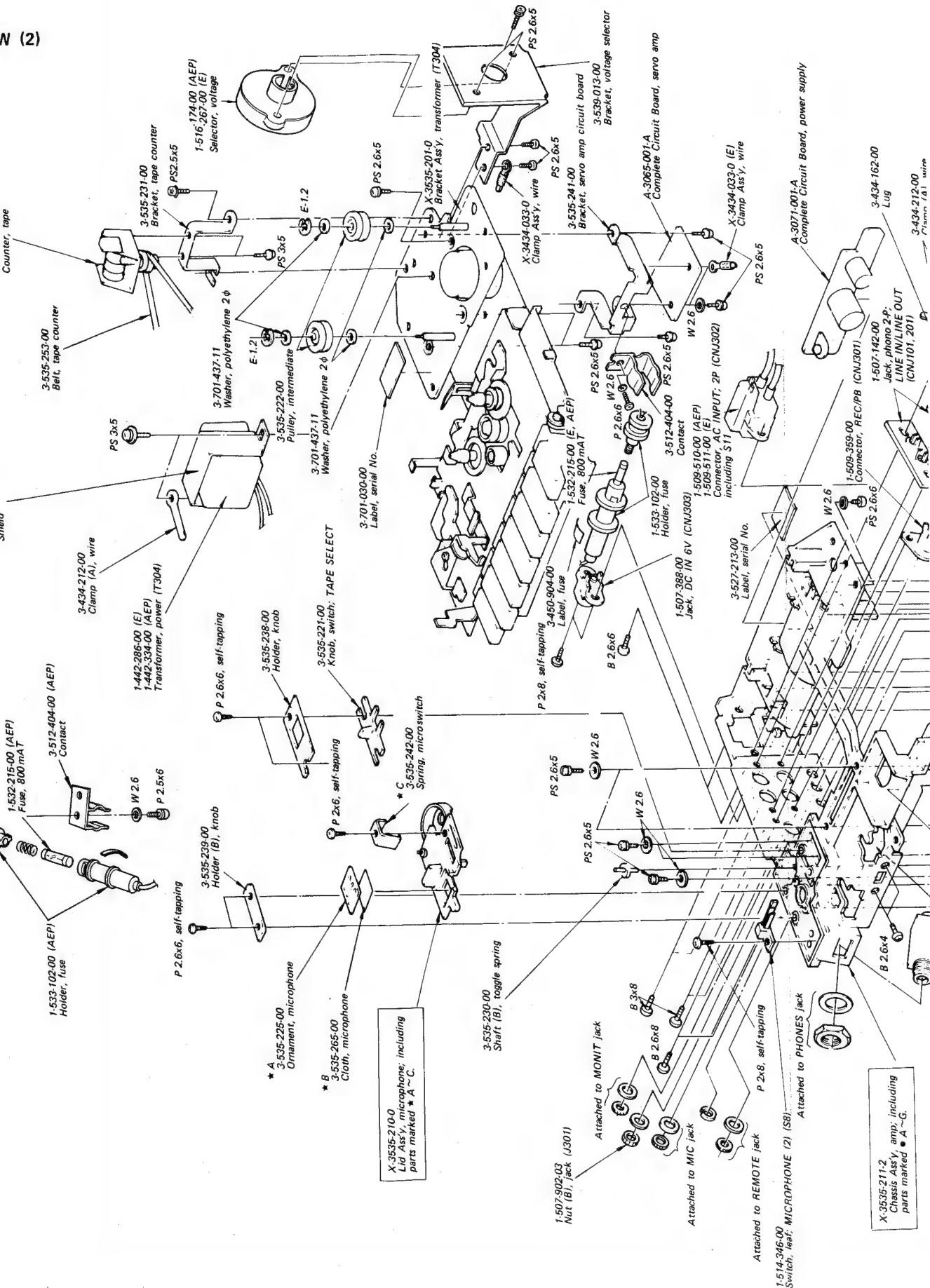
### 6-1. EXPLODED VIEW (1)



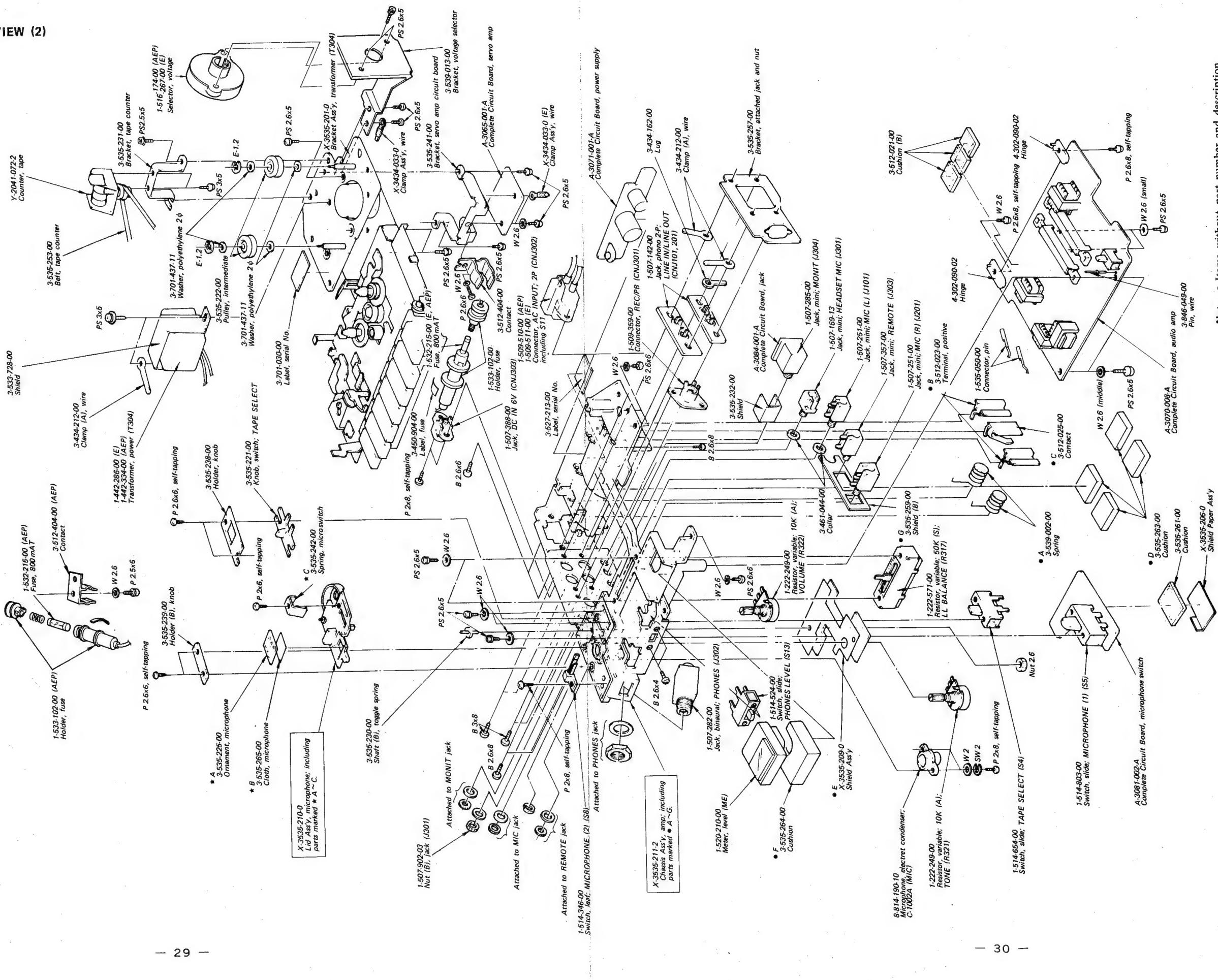
**Note:**

- Items without part number and description are not available.
- All screws are Phillips (cross recess) type unless otherwise noted.
- (-) = slotted head

### 6-2. EXPLODED VIEW (2)



## 6-2. EXPLODED VIEW (2)



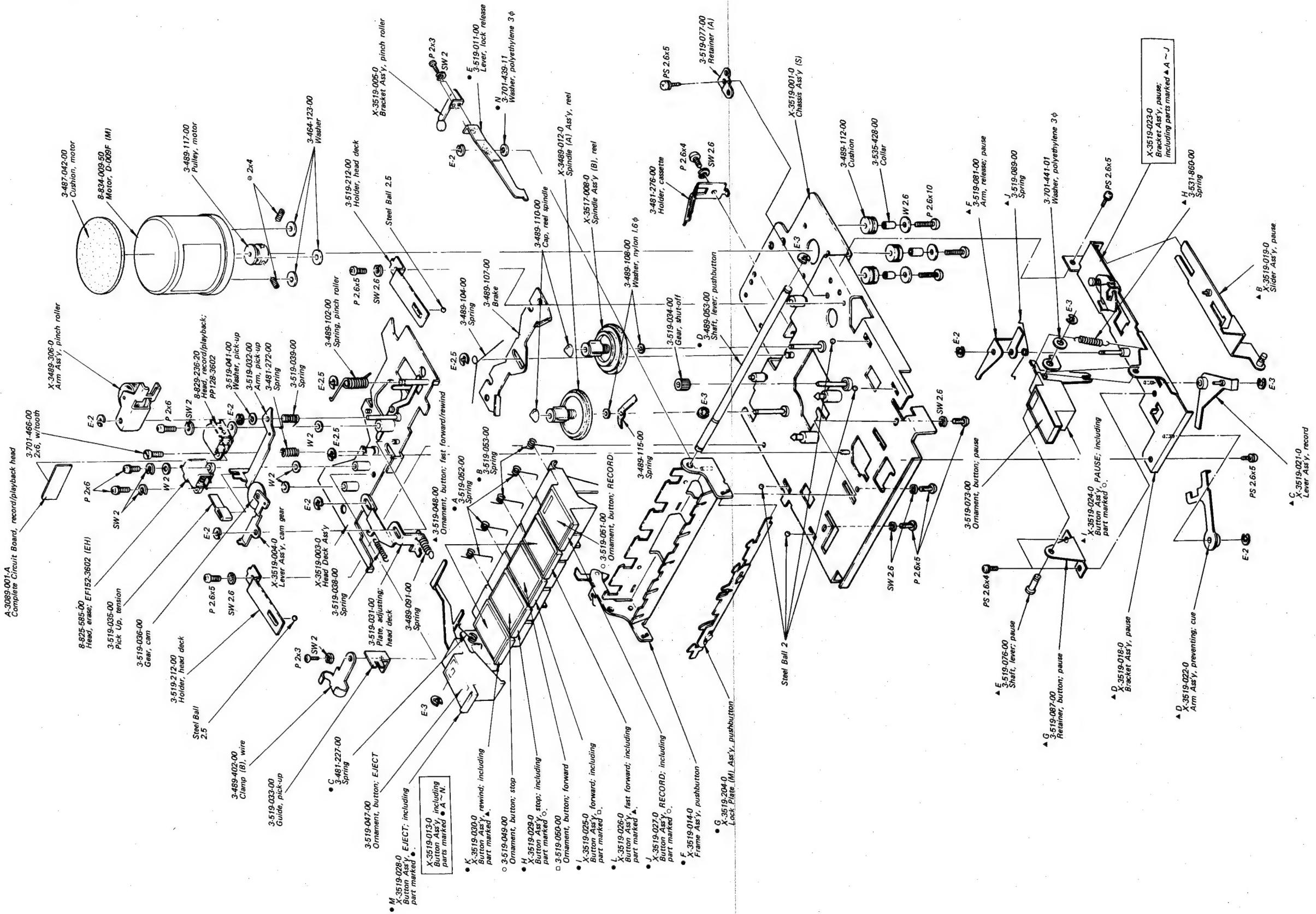
**Note:**

- Items without part number and description are not available.
- All screws are Phillips (cross recess) type unless otherwise noted.  
 (-) = slotted head

TC-156

**TC-156**

### 6-3. EXPLODED VIEW (3)



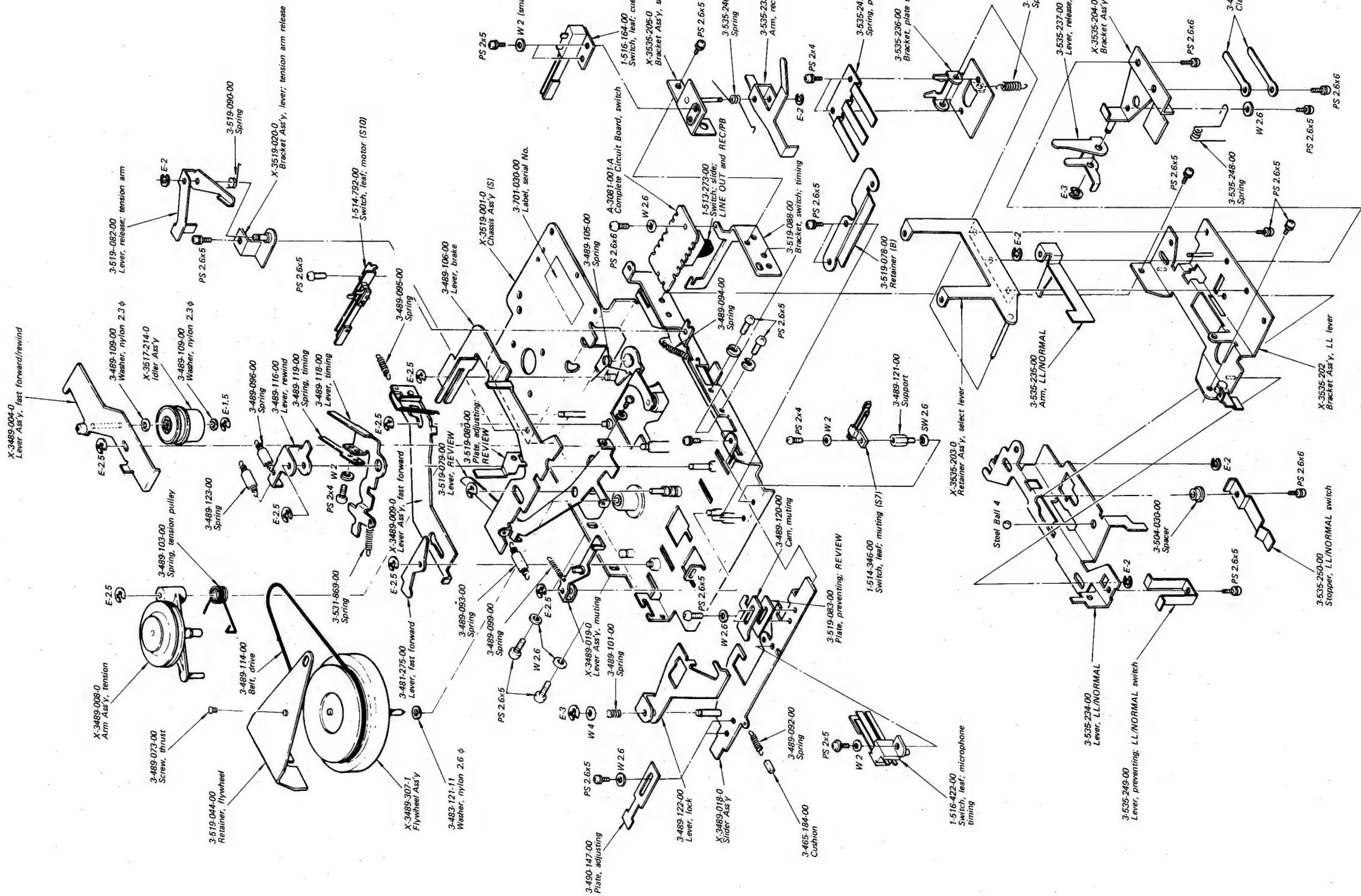
**Note:** o Items without part number and description are not available.

- o All screws are Phillips (cross recess) type unless otherwise noted.

(-) = slotted head

**TC-156**

#### **6-4. EXPLODED VIEW (4)**



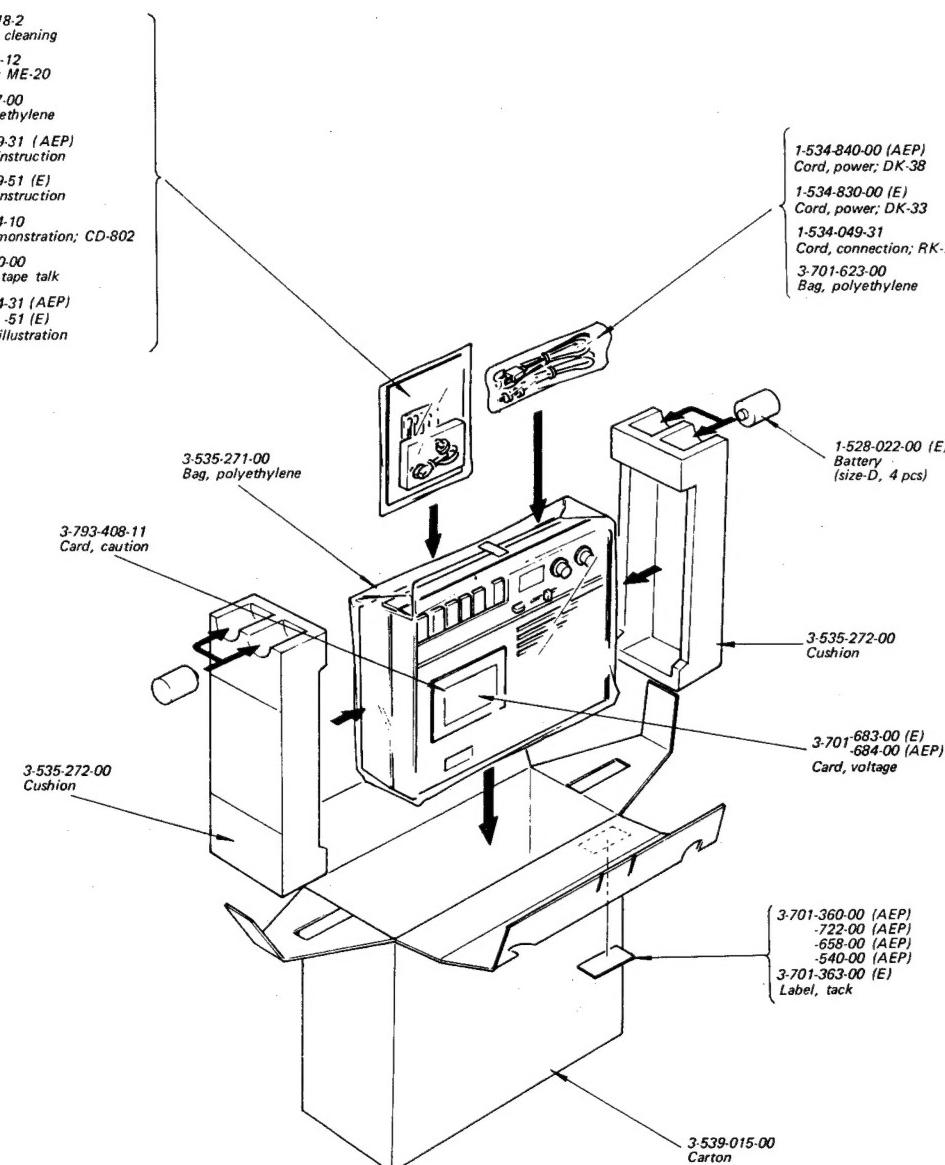
**Note:** ○ Items without part number and description  
are not available.

- All screws are Phillips (cross recess) type  
unless otherwise noted.  
(-) = slotted head

## SECTION 7 ELECTRICAL PARTS LIST

**6-5. PACKING**

X-3701-018-2  
 Tip, head cleaning  
 1-504-034-12  
 Earphone, ME-20  
 3-701-627-00  
 Bag, polyethylene  
 3-780-469-31 (AEP)  
 Manual, instruction  
 3-780-469-51 (E)  
 Manual, instruction  
 8-893-504-10  
 Tape, demonstration; CD-802  
 3-793-010-00  
 Booklet, tape talk  
 3-793-784-31 (AEP)  
 -51 (E)  
 Booklet, illustration



Note: o Items without part number and description are not available.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>		
<b>COMPLETE CIRCUIT BOARDS</b>							
	A-3065-001-A	Servo Amp	L301	1-407-488-00	470μH, microinductor		
	A-3070-008-A	Audio Amp	L302	1-407-169-00	100μH, microinductor		
	A-3071-001-A	Power Supply	L401	1-407-484-21	3.3μH, microinductor		
	A-3081-001-A	Switch					
	A-3081-002-A	Microphone Switch					
	A-3084-001-A	Jack					
	A-3089-001-A	Record/Playback Head					
<b>TRANSFORMERS</b>							
T101, 201	1-427-317-00	Output	T301	1-433-166-00	Bias Osc		
T302	1-423-049-00	Input	T303	1-427-256-00	Output		
T304	1-442-286-00	Power (E)					
	1-442-334-00	Power (AEP)					
<b>SEMICONDUCTORS</b>							
Q101, 201	Transistor 2SC1361						
Q102, 202	Transistor 2SC1363						
Q103, 203	Transistor 2SC1363						
Q104, 204	Transistor 2SC1363						
Q105, 205	Transistor 2SC1363						
Q106, 206	Transistor 2SC1363						
Q107, 207	Transistor 2SC1363						
Q301	Transistor 2SC1361						
Q302	Transistor 2SC1474						
Q303	Transistor 2SC1363						
Q304, 305	Transistor 2SC1474						
Q306	Transistor 2SA772						
Q307 ~ 309	Transistor 2SC1363						
Q401	Transistor 2SC1363						
Q402	Transistor 2SB475						
Q403	Transistor 2SC1474						
D101, 201	Diode 1T-40						
D102, 202	Diode 1T-40						
D301	Diode 1T-22						
D302	Diode VD-1123						
D303	Diode S1RB10						
D401	Diode 1T-40						
D402	Diode 10D-2						
Th1, 2	1-800-199-11	Thermistor S-1250					
<b>COILS</b>							
L101	1-409-141-00	1.8 mH					
L102	1-407-510-00	33 mH, microinductor					
L202	1-407-561-00	33 mH, microinductor					
<b>CAPACITORS</b>							
All capacitors are in μF unless otherwise indicated. (p = μμ, elect = electrolytic)							
C101, 202	1-121-402-11	33	10V	elect			
C102, 202	1-121-391-11	1	50V	elect			
C103, 203	1-105-661-12	0.001	50V	mylar			
C104, 204	1-102-074-11	1000 P	50V	ceramic			
C105	1-105-666-12	0.0027	50V	mylar			
C106, 206	1-121-726-11	0.47	50V	elect			
C107, 207	1-121-413-11	100	6.3V	elect			
C108, 208	1-107-169-11	100 P	500V	silvered mica			
C109, 209	1-102-106-11	100 P	50V	ceramic			
C110, 210	1-121-651-11	10	16V	elect			
C111, 211	1-121-726-11	0.47	50V	elect			
C112, 212	1-121-651-11	10	16V	elect			
C113, 213	1-102-106-11	100 P	50V	ceramic			
C114, 214	1-105-662-12	0.0012	50V	mylar			
C115, 215	1-105-663-12	0.0015	50V	mylar			
C116, 216	1-121-413-11	100	6.3V	elect			
C117, 217	1-107-113-11	18 P	50V	silvered mica			
C118, 218	1-121-651-11	10	16V	elect			
C119, 219	1-105-663-12	0.0015	50V	mylar			
C120, 220	1-107-133-11	120 P	50V	silvered mica			
C121, 221	1-121-651-11	10	16V	elect			
C122	1-105-661-12	0.001	50V	mylar			
C123, 223	1-105-677-12	0.022	50V	mylar			
C124, 224	1-121-419-11	220	6.3V	elect			
C125, 225	1-105-667-12	0.0033	50V	mylar			
C126, 226	1-105-661-12	0.001	50V	mylar			
C127, 227	1-121-651-11	10	16V	elect			

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>			<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>			<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>				
C128, 228	1-107-133-11	120 P	50V	silvered mica	<b>RESISTORS</b>			R203	1-242-737-09	470 k	low noise	R340	1-244-695-11	8.2 k		
C129, 229	1-105-833-12	0.01	50V	mylar	All resistors are $\frac{1}{4}$ W, carbon type, and in $\Omega$ unless otherwise indicated. ( $k = 1000$ , $M = 1000 k$ )			R204	1-242-697-09	10 k	low noise	R341	1-221-311-21	5 k (B) adjustable		
C130, 230	1-107-050-11	12 P	500V	silvered mica				R206	1-244-687-11	3.9 k		R342	1-242-687-11	3.9 k		
C131, 231	1-107-051-11	15 P	500V	silvered mica				R208	1-244-709-11	33 k		R343	1-242-683-11	2.7 k		
C132, 232	1-107-001-11	18 P	500V	silvered mica				R209	1-244-697-11	10 k		R344	1-242-697-11	10 k		
C133, 233	1-107-052-11	22 P	500V	silvered mica								R345	1-242-665-11	470		
C201	1-131-195-11	33	10V	solid tantalum	R101, 201	1-244-739-11	560	R226	1-244-691-11	5.6 k		R346	1-242-661-11	330		
C234	1-102-110-11	220 P	50V	ceramic	R102, 202	1-244-687-11	3.9 k	R228	1-244-681-11	2.2 k		R347	1-242-669-11	680		
C301, 302	1-102-106-11	100 P	50V	ceramic	R103, 203	1-242-737-09	470 k	low noise	R229	1-244-623-11	8.2		R348	1-242-703-11	18 k	
C303	1-105-669-12	0.0039	50V	mylar	R104, 204	1-242-697-09	10 k	low noise	R233	1-244-695-11	8.2 k		R349	1-242-625-11	10	
C304	1-105-673-12	0.01	50V	mylar	R105, 205	1-242-659-11	270					R350	1-242-685-11	3.3 k		
C305	1-105-665-12	0.0022	50V	mylar	R106, 206	1-242-687-11	3.9 k		R301, 302	1-244-679-11	1.8 k		R351	1-244-826-11	11 ( $\frac{1}{2}$ W) (E)	
C306	1-121-391-11	1	50V	elect	R107, 207	1-242-715-11	56 k		R303	1-244-697-11	10 k		R352	1-242-649-11	100	
C307	1-131-193-11	10	10V	solid tantalum	R108	1-222-845-00	100 k (B) adjustable		R304	1-242-707-11	27 k		R353	1-242-699-11	12 k	
C308	1-121-402-11	33	10V	elect	R109	1-242-697-11	10 k		R305	1-222-775-00	22 k (B) adjustable		R354	1-222-845-00	100 k (B) adjustable	
C309	1-121-726-00	0.47	50V	elect	R110, 210	1-242-709-11	33 k		R306	1-242-707-11	27 k		R401	1-242-679-11	1.8 k	
C310	1-121-395-11	4.7	25V	elect	R111, 211	1-242-717-11	68 k		R307	1-222-773-00	4.7 k (B) adjustable		R402	1-222-771-00	1 k (B) adjustable	
C311	1-129-861-11	0.0039	500V	polypropylene	R112, 212	1-242-666-11	510		R308	1-242-673-11	1 k		R403	1-242-671-11	820	
C312	1-131-192-11	4.7	10V	solid tantalum	R113, 213	1-242-666-11	510		R309	1-242-721-09	100 k	low noise	R404	1-242-649-11	100	
C313	1-121-413-11	100	6.3V	elect	R114, 214	1-242-662-11	360		R310	1-242-676-11	1.3 k		R405	1-242-685-11	3.3 k	
C314	1-105-680-12	0.039	50V	mylar	R115, 215	1-242-697-09	10 k	low noise	R311	1-209-766-11	1.5 k	$\frac{1}{16}$ W micro	<b>SWITCHES</b>			
C315	1-105-675-12	0.015	50V	mylar	R116, 216	1-242-659-11	270		R312	1-242-691-11	5.6 k		S1, 2	1-514-976-00	Slide, record/playback	
C316	1-105-682-12	0.056	50V	mylar	R117, 217	1-242-665-11	470		R313	1-242-688-11	4.3 k		S3	1-514-803-00	Slide, LL/NORMAL	
C317	1-105-673-12	0.01	50V	mylar	R118, 218	1-242-709-09	33 k	low noise	R314	1-202-473-31	5.6M	composition	S4	1-514-654-00	Slide, TAPE SELECT	
C318	1-121-414-11	100	10V	elect	R119, 219	1-242-713-11	47 k		R315	1-242-689-11	4.7 k		S5	1-514-803-00	Slide, MICROPHONE (1)	
C319	1-121-651-11	10	16V	elect	R120, 220	1-242-693-11	6.8 k		R316	1-244-689-11	4.7 k		S6	1-516-164-00	Leaf, cue and review	
C320	1-131-209-21	0.1	35V	solid tantalum	R121, 221	1-242-649-11	100		R317	1-222-571-00	50 k (S) adjustable		S7	1-514-346-00	Leaf, muting	
C321	1-105-665-12	0.0022	50V	mylar	R122, 222	1-242-693-11	6.8 k		R318	1-242-689-11	4.7 k		S8	1-514-346-00	Leaf, MICROPHONE (2)	
C322	1-105-833-12	0.01	50V	mylar	R123, 223	1-242-717-11	68 k		R319, 320	1-242-697-11	10 k		S9	1-516-422-00	Leaf, microphone timing	
C323	1-121-419-11	220	6.3V	elect	R124, 224	1-242-681-11	2.2 k		R321	1-222-249-00	10 k (A), variable; TONE		S10	1-514-792-00	Leaf, motor	
C324 ~ 327	1-101-923-11	0.01	25V	ceramic	R125, 225	1-242-717-11	68 k		R322	1-222-249-00	10 k (A), variable; VOLUME		S11	Included in AC INPUT (CNJ302), AC/DC		
C328	1-102-106-11	100 P	50V	ceramic	R126	1-242-691-11	5.6 k		R323	1-242-681-11	2.2 k		S12	1-513-273-00	Slide, LINE OUT (REC/PB)	
C329, 330	1-121-420-11	220	10V	elect	R127	1-242-666-11	510		R324	1-242-695-11	8.2 k		S13	1-514-524-00	Slide, PHONES LEVEL	
C331	1-121-651-11	10	16V	elect	R128	1-242-681-11	2.2 k		R325	1-244-703-11	18 k		S14	1-516-267-00	Slide, voltage selector (E)	
C332	1-102-074-11	1000 P	50V	ceramic	R129	1-242-623-11	82		R326	1-244-697-11	10 k					
C333	1-121-414-11	100	10V	elect	R130, 230	1-242-733-11	330 k		R327	1-242-677-11	1.5 k					
C334	1-121-659-11	2200	10V	elect	R131, 231	1-242-705-11	22 k		R328	1-244-659-11	270					
C335	1-121-414-11	100	10V	elect	R132, 232	1-242-695-11	8.2 k		R329	1-244-625-11	10					
C336	1-121-736-11	1000	10V	elect	R134, 234	1-242-715-11	56 k		R330	1-242-645-11	68					
C401	1-121-419-11	220	6.3V	elect	R135, 235	1-242-683-11	2.7 k		R331	1-242-669-11	680		J101, 201	1-507-251-00	Mini, MIC	
C402	1-121-420-11	220	10V	elect	R136, 236	1-242-673-11	1 k		R332	1-242-646-11	75		J301	1-507-169-13	Mini, MIC (HEADSET)	
C403, 404	1-101-923-11	0.01	25V	ceramic	R137, 237	1-242-721-11	100 k		R333	1-242-673-11	1 k		J302	1-507-282-00	Binaural, PHONES	
					R138, 238	1-242-721-11	100 k		R334, 335	1-242-609-11	2.2		J303	1-507-357-00	REMOTE (MIC)	
					R139, 239	1-242-725-11	150 k		R336							

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>	<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
CNJ302	1-509-510-00	2P, AC INPUT, including S11 (AEP)	MIC	8-814-190-10	Microphone, electret condenser; C-1002A
CNJ302	1-509-511-00	2P, AC INPUT, including S11 (E)	RPH	8-829-236-20	Head, record/playback; PP128-3602
CNJ303	1-507-388-00	DC IN 6V	SP	1-502-480-00	Speaker
<b>MISCELLANEOUS</b>					
EH	8-825-585-00	Head, erase; EF152-3602		1-535-047-00	Connector, solderless (E)
M	8-834-009-50	Motor, D-009F		1-535-050-00	Connector, pin
ME	1-520-210-00	Meter, level	F1	1-532-084-00	Fuse, 100 mAT
			F2	1-532-215-00	Fuse, 800 mAT (AEP)
				1-533-102-00	Holder, fuse
				1-516-267-00	Switch, voltage selector (E)
				1-516-174-00	Switch, voltage selector (AEP)

## SECTION 8

### HARDWARE

<u>Part No.</u>	<u>Description</u>		<u>Part No.</u>	<u>Description</u>	
<b>SCREWS</b>					
All screws are Phillips type (cross recess type) unless otherwise indicated. (-): slotted head.				7-623-108-05	3 middle
7-621-170-39	(-)	2x4	7-623-108-11	3	middle
7-621-255-15	P	2x3	7-623-110-02	4	
7-621-255-25	P	2x4	7-623-205-22	2	spring
7-621-255-45	P	2x6	7-623-205-31	2	spring
7-621-259-25	P	2x4	7-623-207-22	2.6	spring
<b>RETAINING RINGS</b>					
7-621-259-35	P	2.6x5	7-624-101-01	E1	1.2
7-621-259-65	P	2.6x10	7-624-102-01	E	1.5
7-621-770-50	B	2.6x6	7-624-104-01	E	2
7-621-770-62	B	2.6x5	7-624-106-01	E	3
7-621-770-94	B	2.6x10	7-624-108-01	E	4
7-671-771-38	B	2.6x8	7-624-118-01	E	2.5
7-621-773-65	B	2.6x4	7-624-124-01	C2	
7-682-523-03	B	2x3	<b>NUT</b>		
7-682-549-05	B	3x8	7-684-012-01	2.6	
7-682-624-01	PS	2x4	<b>LUG</b>		
7-682-625-01	PS	2x5	7-623-508-01	2.6	
7-628-253-92	PS	2.6x4	<b>STEEL BALLS</b>		
7-628-254-05	PS	2.6x5	7-671-112-01	2	steel ball
7-628-254-15	PS	2.6x6	7-671-112-11	2.5	steel ball
7-682-646-01	PS	3x5	7-671-114-01	4	steel ball
7-682-648-01	PS	3x8	<b>RIVET</b>		
7-685-104-21	P	2x6, self-tapping	7-625-112-11	2.6x3	
7-685-105-21	P	2x8, self-tapping			
7-685-133-21	P	2.6x6, self-tapping			
7-685-134-21	P	2.6x8, self-tapping			
<b>WASHERS</b>					
7-623-105-01	2	small			
7-623-105-02	2	small			
7-623-105-15	2				
7-623-107-01	2.6	small			
7-623-107-02	2.6	small			
7-623-107-11	2.6	middle			
7-623-107-12	2.6				

**Sony Corporation**

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